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A Paper

ON

THE USES OF NON-SPECIFIC PROTEIN THERAPY*

BY

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Non-specific protein therapy has now been in use for a sufficient number of years to allow us to form some idea of its value and uses.

PROPER PLACE OF THERAPY

At one time it was thought that in every infection there was a corresponding specific reaction, and that in order to combat successfully any disease by inoculations the corresponding specific serum or vaccine must be employed. There are, however, many indications that this is not the case. In the infectious fevers, for example, there is a common factor in the sickness, malaise, rise of temperature, skin rash, etc., and the specific factor, which is characteristic of each disease and which enables it to be distinguished. Of the two factors, provided the disease is in an early stage and toxins as yet not fully developed, the common factor is the important one from the point of view of combating and shortening the duration of the infection. Non-specific protein treatment is used to assist the reactions which are common to all infections and conditions in which sensitization has occurred, and so enable the individual to desensitize or immunize himself. It is well known that an attack of one disease often has a very beneficial effect on another entirely different disease from which the patient may be suffering at the same time.

If a patient with psoriasis or a chronic eczema develops pneumonia or other disease with a temperature which lasts several days, the skin disease will usually improve enormously or even disappear. There is also the well-known fact that an attack of erysipelas on the top of lupus vulgaris may cause an extraordinary improvement in the lupus. Reactions at one time thought to be absolutely specific are now known not to be so—for example, tuberculosis of the skin reacts to injections of trichophytin, milk, and many other substances in the same way as to the specific tuberculin. It is also known that a skin which has become sensitive to one particular irritant also becomes more sensitive than it was before to other irritants as well.

Therefore, although on first consideration it might be thought that non-specific therapy is illogical and unscientific, the above facts and many others point to its being a form of treatment based on rational and scientific foundations. When a foreign protein is introduced into the system, certain reactions follow, with rise of temperature, alterations in the blood, etc. Hence this form of treatment has been designated protein shock or pyrogenic therapy.

METHODS IN USE

A large number of methods have been used to produce this shock effect. They may be divided into the following groups:

1. Blood and serums (*a*) normal—for example, human, horse, sheep, ox, goat, or chicken; (*b*) antitoxic—for example, anti-diphtheritic, anti-streptococcal serum, etc.; (*c*) fluid from blisters, pleural effusions, cerebro-spinal and joint fluids.

2. Milk (cow's) and preparations made from milk—for example, aolan, caseosan, and lactin.

3. Tissue extracts, both human and animal—for example, spleen extracts, tumour extracts, and autolysates, and skin-scale extracts.

4. Vegetable extracts—for example, pollen extracts; seed extracts—for example, millet and alfalfa.

5. Bacterial proteins of all kinds—for example, non-specifically used vaccines and tuberculins of all kinds, pure or in mixture, Coley's fluid.

6. Split proteins—for example, proteoses, deutero-albumoses, and peptones.

7. Chemicals, such as turpentine, injected so as to produce a "fixation abscess" causing a breaking down of tissue, and, by absorption, a protein shock effect.

8. Artificially induced diseases—for example, malaria.

It is also a question whether the administration of drugs such as mercury, iodides, arsenicals, colloid metals, etc., does not act by breaking down inflammatory tissues with a resulting protein absorption. *X* rays, radium, cauterization, diathermy, freezing with CO_2 snow, ultra-violet light treatment, cupping, and Bier's congestion treatment might also reasonably be included as indirect methods of protein therapy. But in this discussion I do not propose to stress the interpretation of protein therapy to include them. It is also doubtful whether substances such as spleen extracts should be included. Several observers (Birke, Vallery-Radot and Blamoutier, Paul, and Gaté and Charpy) used injections of spleen extracts in urticaria, eczema, pruritus, and dermatitis herpetiformis, etc., with good results in some cases. As the extracts were disalbuminized, it is doubtful whether the results are due to the spleen enzymes or are really a form of protein therapy.

BIOLOGICAL EFFECTS

Many different routes have been used to introduce proteins into the system. Injections may be given intravenously, intramuscularly, cutaneously, and subcutaneously. The intramuscular route is very often preferable to the intravenous because the technique is easier. Many recent observers have stressed the superiority of the cutaneous as against the subcutaneous route, but except with vaccines, where the quantity injected is small, the intracutaneous route is impossible if large doses are to be administered. Whilst usually the injections are given at a distance from the lesions, proteins have also been injected locally into, under, or around the lesions. Time will not allow a discussion of details in the technique of administration of each kind of protein and the intervals at which the injections are usually made. Those of us who have used these methods are all quite familiar with them. The principle which underlies the treatment is the administration of a quantity of protein at short intervals of from two to four days. If the intervals between injections are too long there is a risk of anaphylactic reactions. The dose must be sufficient to cause a moderate general reaction. If the reaction is too severe, symptoms of intoxication appear and more harm than good will result. When a protein is introduced into the system, products of protein breakdown are thrown into the circulation, producing effects very much like those of surgical shock from trauma or the shock seen in extensive burns. What the mode of action of protein therapy exactly is, is still undecided. Clark gives a very good summary of the changes that take place in protein therapy. He states that "the active agent is a product of protein decomposition. The washing of tissue fluids into the circulation produces changes in the blood such as leucopenia followed by leucocytosis; increase in young and atypical erythrocytes and platelets; increase in fibrinogen, globulin, thrombokinase, and blood sugar, in the non-protein nitrogen content, and in the proteolytic

* Read in opening a discussion in the Section of Dermatology at the Centenary Meeting of the British Medical Association, London, 1932.

ferments ; and, finally, an increase in the permeability of the cell membranes and capillaries."

Many observers emphasize the importance of the proteolytic enzymes which are liberated after the injections. Weichardt thinks that, in addition to the stimulation of the body cells to anti-bacterial activity, there is a stimulation of the internal secreting glands and the bone marrow. Hermann contends that specific antibodies are liberated by these non-specific injections, and Larsen thinks that sessile antibodies are thrown off into the circulation, and so healing is promoted. Most observers are agreed that a leucopenia followed by a moderate leucocytosis in two hours or so occurs in protein therapy, but recently Burgess and others have doubted this. They think that the leucocytosis is no more than the normal fluctuation seen after food, etc., so that it would appear that Spiethoff was correct when he stated that the leucocytosis is not responsible for the results obtained. Similarly, a rise of temperature is not essential for a successful result. Many cases which do excellently on protein therapy show little or no rise of temperature. Therefore, which of the many changes occurring after protein injections are essential is still in doubt.

I think it will be practical to take each disease separately and describe what results have been obtained by the different non-specific methods. In that way a good idea will be obtained of the value of the treatment in each disease.

DISEASES IN WHICH NON-SPECIFIC THERAPY HAS BEEN USED

Urticaria, including Angioneurotic Oedema and Urticaria Papulosa.—In urticarias and angioneurotic oedema, where the cause cannot be found, non-specific therapy is sometimes a very useful method of treatment. C. S. Wright, out of forty-nine cases treated with auto-haemotherapy, had twenty-three absolute cures, eleven which improved but relapsed, and fifteen failures. Vallery-Radot and Rouquès recommend peptone therapy, and if that fails, auto-sero- or auto-haemotherapy. Many others also report good results with auto-serum and auto-blood. Schulmann emphasizes the importance of continuing the injections for some weeks after the disappearance of the eruption. O'Leary, Fordyce, and Ullmann, however, had disappointing results by these methods. G. T. Brown, after trying sterilized milk, auto-blood, distilled water, and horse serum, unhesitatingly recommends, as producing the best results, a 33⅓ per cent. peptone solution, given at first intradermically for the smaller doses, and later subcutaneously. Linser cured fifteen out of eighteen cases of chronic urticaria with injections of healthy normal human serum, and in twenty-four cases of urticaria papulosa in children all were cured after one or two injections of the mother's serum.

Eczema and Dermatitis.—In eczema in adults non-specific therapy on the whole has worked fairly satisfactorily. Out of twenty-eight different observers, whose records I have looked up, twenty-one report good results either on the way of cure or marked improvement of the condition ; three found very slight benefit, and four report definite negative results. All methods have been used. The most frequently used method was auto-sero- or auto-haemotherapy. But turpentine injections seem to give just as good, if not better, results. Milk, and milk preparations, such as aolan, have given less satisfactory results. Vaccines (typhoid, staphylococcus and streptococcus) have also been used, but less frequently. Personally I have used peptone and milk injections in a few cases of chronic eczema which failed to respond to other treatment, with, on the whole, rather disappointing results.

There are very few records of the treatment of infantile eczema. Linser and McDonell both report good results with auto-serum, and Ullmann in two cases of generalized infantile eczema found no result from auto-serum treatment alone, but exceptionally rapid improvement when local treatment as well was instituted. I have repeatedly tried giving small doses of peptone by the mouth half an hour before food in cases of infantile dermatitis, but without the slightest result.

Dermatitis of External Origin.—I can find only two records of such cases being treated by protein therapy. Hajos treated ten cases of occupational dermatitis, where the cause could not be found, with injections of turpentine with good results. Grimes noticed that an acute dermatitis due to *Rhus toxicodendron* cleared up within thirty-six hours after a road accident in which the patient fractured his thigh and suffered from extensive extravasation of blood. Later he treated twenty cases of *Rhus toxicodendron* dermatitis with injections of the patient's own blood. In all, the acute dermatitis cleared up very rapidly.

Light Dermatitis.—In 1925 Castle reported a cure of dermatitis solare with four injections of peptone. In the last few years I have treated seven cases of dermatitis solare with peptone subcutaneously. Two of these cases I have been unable to follow up. In two there was no benefit, in one marked improvement in light tolerance occurred, and in two definite cure resulted. One of these cured patients remained well for two seasons so that she could go out in the sun with impunity. In the third year the sensitiveness returned, but on receiving another course of six peptone injections she was again cured. Apparently in such cases the desensitization only lasts for about two years. In none of my cases was there any haematoporphyrinuria. They all belonged to what Barber has designated the adult group of dermatitis solare as distinct from the juvenile group of hydroa vacciniforme. Castle's case was one of this type. I also treated a case of dermatitis due to heat rays. This dermatitis occurred after exposure to any kind of heat. A course of peptone injections had no effect upon it.

Neurodermatitis : General and Local Pruritus.—Good results with auto-serum and auto-haemotherapy in cases of pruritus have been recorded. Milk and milk products have also been employed with satisfactory results. Appel found turpentine injections, on the whole, were successful in general pruritus, but in some cases relapse occurred and treatment had to be repeated. As all forms of neurodermatitis are usually very stubborn, these results with non-specific methods seem to be satisfactory.

General Exfoliative Dermatitis.—The only records I can find on this condition are of two cases. In 1916 Engman and McGarry treated a case with typhoid vaccine intravenously. The result was very satisfactory. The eruption paled rapidly and soon disappeared. McDonell also reports a similar cure with auto-serum injections. In 1924 I recorded a spectacular cure of exfoliative dermatitis with milk injections. Since then I have employed milk injections in seven other cases. In six the results were negative, and in one, which was an exfoliative dermatitis on the top of a psoriasis, the result was extremely good, the eruption rapidly disappearing but leaving the psoriasis unaffected.

Pemphigus.—Pemphigus chronicus has been extensively treated with protein. Auto-serotherapy has given astonishing results in a few cases. Praetorius reports complete cure in a case of two years' duration. Many cases were improved but some unaffected. Auto-haemotherapy has also been frequently tried. Breda treated three cases, and in all the eruption disappeared completely. In the majority of the cases, however, improvement only was noted, and in some cases the result was negative. Fischer had an apparent complete cure in a case of chronic pemphigus from the use of injections of human blood together with neosalvarsan, and Perry reports marked improvement after injections of normal horse serum. Milk injections were used by O'Leary and Ambrosoli with only temporary result. Holobut and Lenaskowicz and Don Giovanni obtained improvement by the subcutaneous injection of fluid from the patient's own blisters. Turpentine injections were also given by Klingmüller and Gewalt with good results.

Pemphigus Foliaceus.—One case treated by Passini with intravenous vaccine showed no result, and Linser found improvement in one case treated with normal human serum.

Pemphigus Vegetans.—Gougerot, Civatte, and Blum record a complete cure after auto-haemotherapy together with 914, and Ruete reports improvement with an auto-vaccine. Capelli and Signorelli, using a cholera vaccine, noted improvement, but Passini had no result with an intravenous vaccine in one case. Therefore, in all forms of pemphigus, which is such a chronic and serious disease, non-specific protein therapy, although it does not hold out the prospect of

permanent cure, except occasionally, is a method worthy of trial.

Dermatitis Herpetiformis.—Auto-serotherapy, hetero-serotherapy, auto-haemotherapy, intravenous typhoid vaccine, and intravenous deutero-albumose, have all been used in the treatment of dermatitis herpetiformis. In nearly every case improvement or a complete disappearance of the eruption has occurred for a shorter or longer period, but invariably this is followed by a relapse. This agrees with my own experience of auto-haemotherapy in this disease.

Pregnancy Dermatoses.—Auto-serum has been used by Stümpke in the treatment of herpes gestationis with good result. Linser, Rubsamen, Veirl, and Mayer each record a case of cure of herpes gestationis with injections of serum from normal pregnant women. By the same method Linser and Mayer have also cured cases of urticaria occurring during pregnancy. Similarly Mayer and Rongy each record cures of general pruritus occurring during pregnancy. In no case had the injections any ill-effect on the pregnancy.

Psoriasis is the disease in which non-specific therapy has been most frequently used. It would serve no purpose to enumerate the results of each observer, as many of them refer to only a few cases. Auto-serotherapy, auto-haemotherapy, intravenous vaccines (chiefly typhoid), and milk and its derivatives have been extensively used. The majority of observers found benefit from these methods, but a few obtained no result. The consensus of opinion seems to be that, whilst in an occasional case a striking result can be obtained by injections alone, in the majority of cases the only result is to increase the susceptibility to local treatment, especially with chrysarobin, and so hasten the cure. I think that those of us who have tried this form of treatment will agree with this conclusion.

Lichen Planus.—Although comparatively few cases of lichen have been treated non-specifically, on the whole the results have been encouraging. Payenville and Trotabas had a case of almost universal lichen which developed diphtheria, for which he received eight injections of anti-diphtheritic serum. In sixteen days the lichen had completely disappeared. Whether this result was due to the diphtheria or to the serum is not quite clear. Stümpke and Gottheil and Satenstein using auto-serum, Kren and Ambrosoli using milk injections, and Cadbury using typhoid vaccine, all noted improvement and in some cases rapid disappearance of itching and eruption. The best results, however, were obtained by Klingmüller with turpentine injections.

Staphylococcal Infections.—Weirauk treated twenty-six cases of carbunculosis with milk injections, and in twenty of these the lesion subsided or only required simple incision. Pospelow, Ambrosoli, and A. Kraus also had satisfactory results in furunculosis with the same method. Auto-haemotherapy has proved useful not only in promoting rapid healing in furunculosis, but in clearing up recurrent cases. Autoserum has not proved so successful. Intravenous vaccines have produced slight benefit in carbunculosis and poor results in furunculosis. Turpentine injections (Levin and Rose, Appel, Becher) have also given good results in boils and pyodermias. In sycosis, Gawalowski did not find the benefit from milk injections which he obtained in tinea barbae, but Pospelow claims some successful results. O'Leary reports only fair results with intravenous typhoid vaccine in sycosis, and Capelli and Signorelli complete failure in a case of lupoid sycosis. The only really satisfactory results which are recorded are two cases of Wright's, both of which were cured and remained well after two injections of turpentine.

Streptococcal infections have seldom been treated non-specifically, with the exception of erysipelas, in which milk and its derivatives, such as aolan, have proved very successful even in desperate cases. El Sayed and Turnheim stress the benefit of injecting the milk near or round the lesion. Hoff and Heesch used auto-blood, and Pines reports recovery in a very bad case in an infant after injections of the father's blood. Basset obtained cures in from two to six days with a polyvalent antiserum. Anti-diphtheritic serum has been used with excellent results. Campani and Bergolli obtained better results with anti-diphtheritic serum than with the specific anti-streptococcal serum.

Ringworm.—In deep-seated trichophyton infections of the skin and beard very good results are reported. Milk, aolan, and lactin produced rapid involution of the lesions, and turpentine was used with marked success. Löwenfeld and Pulay compared the effects of trichon (specific), tuberculin and turpentine (non-specific), and obtained the same good results with all three preparations. Loeb, using a mixed staphylococcal vaccine, found that deep-seated tinea barbae healed fairly rapidly, but the results were not so good in superficial ringworms. The only unsatisfactory report is by O'Leary, who used bacterial vaccines and other non-specific methods without much benefit.

Lupus Erythematosus.—In its subacute and chronic forms, lupus erythematosus responds fairly well to desensitization methods. Klingmüller and Wright used turpentine, A. Kraus milk injections, and Engman and McGarry typhoid vaccine with benefit. MacCormac had a good result in one case with injections of normal saline.

Lupus Vulgaris.—Klingmüller showed that cases treated with turpentine injections gave focal reactions in the lesions. Appel also found that turpentine had the same effect as tuberculin injections. Marked local and general reactions occurred. In lupus cases so treated the inflammation disappeared from the lesions in all cases and sometimes also the lupus nodules.

Erythema multiforme, purpura, scurvy, prurigo, herpes zoster and simplex, parapsoriasis, impetigo, erythema, erysipeloid, acne, actinomycosis, pityriasis versicolor, pityriasis rosea, alopecia areata, leprosy, aphthous stomatitis, Darier's disease, warts, and mycosis fungoides are some of the other diseases in which non-specific protein therapy has been used in a very limited number of cases.

Venereal Diseases

Syphilis.—All stages of syphilis have been treated with non-specific injections either alone or in combination with some form of drug treatment. Milk injections, or a combination of milk and auto-haemotherapy, were used in primary syphilis by Ahlswede. He thinks that all cases of early syphilis, especially where the Wassermann reaction is already present, should have a combined treatment with non-specific therapy and drugs. Greenbaum and Wright obtained partial or complete involution of secondary and tertiary lesions with injections of milk without the aid of any drugs. Beume reports a case of syphilis which did not clear up with several courses of neosalvarsan, mercury, and bismuth. This man had an accident which resulted in extensive haemorrhage into and round the knee and ankle-joints. The syphilitic eruption rapidly disappeared and the Wassermann reaction became negative, even although no further drug treatment was being given. This must be looked upon as a case of auto-haemotherapy. Bernucci, in early syphilis, found improvement with milk injections, but the final results were unsatisfactory unless drugs were also given. Tuberculin injections have been used in secondary syphilis by Bloch and Biach, typhoid and cholera vaccines by Ersettig, Capelli and Signorelli, Engman, Jorsted and Engman, and Kemp and Stokes. In some cases primary or secondary lesions disappeared, but the results were not satisfactory unless drugs were also used. This corresponds with the experimental findings of Kolmer, who treated early testicular syphilis of rabbits with T.A.B. vaccine, but failed to get a cure. An attack of malaria has been known to influence beneficially cases of syphilis even in the early stages. Kerl found that artificially induced malaria had no effect on primary syphilis, but that it did good in the later stages (two to six years). Vonkennel also found induced malaria combined with drug treatment in primary and secondary syphilis not strikingly superior to treatment with arsenic and bismuth alone. On the same lines Schamberg and Tseng treated cases of secondary syphilis with very hot baths daily to induce a temperature, and obtained improvement or even disappearance of the skin lesions.

It therefore is evident that all forms of protein shock treatment, especially if a temperature is induced, will influence the early stages of syphilis beneficially, but not to such an extent as to warrant their adoption generally, either alone or in combination with drug treatment. The position is quite otherwise, however, in the later stages of syphilis, and especially

in neurosyphilis. Within recent years malarial therapy has been very extensively used in the treatment of neurosyphilis, and especially in tabes and G.P.I. The results have, on the whole, been very satisfactory, due consideration being given to the fact that anti-syphilitic drug treatment alone is usually unsatisfactory. The malarial treatment, however, has certain disadvantages. It may not be easy to obtain a donor, and some individuals, especially in the coloured races, have an immunity to malaria, so that the malarial attacks die out spontaneously and prematurely. Once the attacks are established, their severity cannot always be controlled. In addition, there has been a certain mortality from this treatment. For these reasons other easier and safer methods of producing a temperature reaction have been experimented with. Bornstein obtained good results in neurosyphilis with milk injections combined with arsenic. Schacherl in 1914 used tuberculin injections combined with mercurial treatment. In tabes dorsalis typhoid vaccine has been used by Nelson, Kemp, and Stokes ; other bacterial vaccines by Fischer and Dollken. In many cases an improvement and remission of the symptoms has resulted. Recently Gibson and Gordon treated cases of tabes with hot baths of a temperature of 106 to 110° F. for forty-five to fifty minutes daily till the patient's temperature rose to 106 or 107°. These were continued every day for about nine months, with very striking improvement in the condition.

General Paralysis.—Typhoid vaccine has been used for this, and the results were just as good as with malarial treatment. Jakow and Joachim similarly used injections of old tuberculin to produce a temperature reaction in these cases. Von Jauregg used a staphylococcal vaccine and obtained remission of symptoms in 74 per cent. of the cases which were in the earlier stages of the disease.

Non-specific protein therapy also has a definite effect on the Wassermann and other serological reactions of syphilis. This is to be expected, as there is a definite general tissue reaction following such treatment. Milk, peptone, vaccines (typhoid, cholera, tuberculin), together with drug treatment, have all been noted as influencing the Wassermann reaction favourably. Uddgren and Schreiner both found that the Wassermann reaction became more rapidly negative after milk and peptone injections together with drugs than was the case when drugs alone were used. Schamberg and Tseng also noted slight improvement in the Wassermann reaction in secondary syphilis in patients treated with hot baths. A few observers, however, have seen no effect on the Wassermann reaction from non-specific therapy.

Ulcus Molle and Complications.—A great many cases of soft sore and the accompanying buboes have been treated with milk injections. All observers emphasize the very beneficial effect of the milk injections on the buboes. If unburst, the glands nearly always diminish rapidly in size, and heal without requiring to be opened: if discharging, rapid healing takes place. The soft sores themselves also healed promptly in nearly every case. Becher reports excellent results with turpentine injections and Spiethoff with auto-serum. Treubel, and Bussalai and Devoto saw rapid healing of ulcers and glands with auto-haemotherapy. Almkvist had similar good results with injections of tuberculin. Mariani, who used all kinds of protein therapy, concluded that in soft sore hetero-proteins, especially peptone, give better results than hetero-serums or vaccines. Therefore, in soft sore and buboes, all non-specific methods can be relied on to give satisfactory results.

Gonorrhoea and Complications.—As in the previous disease many methods of treatment have been adopted. Milk injections have been used with satisfactory results in both gonorrheal urethritis and its complications. Spiethoff recommends auto-serum for gonorrhoeal prostatitis, and Bussalai and Devoto and Mariani report equally good results with auto-haemotherapy in all forms of gonococcal infection. With turpentine injections Krebs found the duration of a urethritis was shortened, and there were fewer complications than usual. Becher also found turpentine injections very useful in posterior urethritis, epididymitis, prostatitis, and arthritis. Normal horse serum has also been extensively used. L. D. Smith found it just as good as an anti-gonococcal serum. R. A. Brown, in gonorrhoeal epididymitis, obtained almost equally good results with anti-diphtheritic serum as with normal horse serum, but the anti-diphtheritic serum, in addition to a smaller dose being required, was preferable, as it was more efficient in ameliorating the symptoms. Culver reports good results in gonorrhoeal arthritis with injections of *B. coli* vaccine and of deutero-albumose. Apparently, any of these non-specific methods give just as satisfactory results in the treatment of gonorrhoea and its complications as the specific gonococcal vaccines and antiserums.

CONCLUSIONS

The foregoing results, therefore, show that non-specific protein therapy has a very wide field of application in skin and venereal diseases. Practically all the conditions which benefit are conditions in which sensitization is either definitely known or is suspected to occur. Many of them are acute or chronic infections of known or unknown origin, and injection of proteins, by stimulating the protective mechanism, leads to rapid cure.

Although there is less risk of anaphylactic reactions than is the case with specific desensitization, there are certain dangers connected with the treatment. Anaphylactic shock reactions have only been reported in two cases (Sachs, Oppenheim). They both occurred from milk injections after the second and third injections respectively. In both cases the preceding injection had been given seven days before. Both patients recovered. In using milk injections care must always be taken not to introduce the milk into a blood vessel, otherwise fat embolism results—as occurred to me on one occasion. In auto-serum and auto-blood injections, there is no risk such as is always present when foreign serums are used.

There are certain contraindications to the use of protein therapy. The patient should always be in fairly good condition. Injections should also be given as early as possible. One should not wait till the condition is desperate and the powers of reaction are exhausted. Alcoholism is an absolute contraindication. Several cases are recorded in which delirium tremens developed during a course of protein treatment, and one case ended fatally. Pregnancy is given by Petersen as a contraindication, but that cannot be so, as pregnancy dermatoses have been successfully treated without any effect on the pregnancy. The most important factor is the condition of the myocardium. Patients with chronic myocardial changes and advanced arteriosclerosis should not be treated by these methods. Valvular heart disease is not a contraindication unless there is a very gross lesion and the heart is in difficulties. Lindrig and Uddgren think that diabetics should not be treated, but Kemp and Stokes consider it safe if the patient is carefully watched. Pulmonary disease, especially tuberculosis, may show focal reactions, and care must therefore be exercised in these cases. Marked degrees of focal infections may also be aggravated by non-specific injections. Old age and infancy, provided the general condition is good, are not to be considered as contra-indications.

Thus, bearing in mind the foregoing contraindications, non-specific protein therapy may be considered a very useful and safe method of treatment for many diseases. It should not be used to replace specific therapy where that is possible. It may be used as the sole means of treatment, but the best results are obtained in combination with suitable general or local drug treatment. It is not very important which form of protein is used. Auto-haemotherapy, milk, turpentine, bacterial vaccines, etc., all give almost equally good results. The important point is to so regulate the dosage that an appropriate and not too severe reaction is produced. More than one method may be used in the same case if the first method tried is unsuccessful. It is not a treatment to be used as a routine, but is very useful in many conditions where all other methods have failed to give relief.

OTITIS MEDIA IN SUCKLINGS *

BY

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This subject of otitis media in infants has not received the attention it merits in this country ; while there is a considerable French, American, and German literature, British references are few. That the subject is important its choice for this Centenary Meeting of the British Medical Association shows, and one of the functions of this discussion is to focus the attention of physicians on the ear as an important factor in the causation of illness in sucklings.

Why are sucklings considered worthy of discussion? The answer is that sucklings—infants in the first year of life—are delicate organisms who are learning to accommodate themselves to the environment of human life, building up a resistance to the infections that surround them. The majority succeed, but during this time three characteristics distinguish them. (*a*) They are peculiarly susceptible to infection both of the skin and of mucous membranes, and withstand infections badly. (b) They react to all disturbances of metabolism and infections in the same way, by disturbances of the gastro-intestinal tract ; they suffer from diarrhoea, they vomit, refuse food, lose weight, are restless and cry, and their temperature is often considerably raised. Diarrhoea, if severe, is a frequent cause of death, and the original cause of the diarrhoea may be undiscovered and escapes treatment. (*c*) They are unable to give any indication of their symptoms ; they cannot tell us where their pain is.

A physician faced with an infant suffering from diarrhoea and sickness has to consider that the infant may have some hidden focus of infection, some serious disease—for example, anterior poliomyelitis, or some trivial error in diet. Post-mortem examination affords valuable evidence on the possibility of ear infection as a cause of illness. Necropsies on sucklings dying from diarrhoea and vomiting reveal lesions remote from the intestine ; also it is noticed that in almost all infants, whatever the cause of death, purulent fluid is present in the middle ears. This infection has been therefore taken to be terminal, and to have no causal relation with the final illness. On the other hand, some cases show pus in the middle ear and antrum, thrombosis of the lateral sinus, and even meningitis—indicating that disease here was certainly not merely terminal, but the actual cause of the final illness.

The word " suckling " does not, I feel, confine our discussion to breast-fed infants, but includes those bottle-fed ; the latter run risks of infection which the former should escape. Hygiene and proper feeding are of the greatest importance in maintaining normal health in babies. Even bottle-fed babies, kept under ideal hygienic conditions and fed correctly, escape infections of the upper respiratory tract. Dean and Daniels established a ward for study of normal infants. Newborn infants were placed in the ward and remained till the age of 2 years. They received a suitable diet and correct amounts of vitamins ; the inorganic constituents of the food were regulated ; and the infants were, too, in ideal hygienic surroundings. During the two years no laryngologist or otologist had to be called in to the ward. The infants were " followed up." Till the age of 7 none had a sign of dental caries. Only one case of mastoiditis occurred, and this was apparently due to accidental cutting off of fat by the mother.

However, in this country infants do not live in ideal surroundings, neither do they receive an ideal diet, and they certainly suffer from otitis media.

* Read in opening a discussion in the Section of Laryngology at the Centenary Meeting of the British Medical Association, London, 1932.

PATHOLOGY OF OTITIS MEDIA IN INFANTS

Anatomically the infant's middle ear offers an easier approach for infections from the nose and throat than the adult's, since the Eustachian tube is relatively shorter and broader. A suckling's skin and mucous membranes are very readily infected, especially by the streptococcus and pneumococcus. Infection in the mother or other member of the family is easily passed on to the infant, taking the form of " a cold " or pharyngitis, which may lead to otitis media. That the pharynx is inflamed is evident from the frequent association of an enlarged cervical gland and otitis media in infants. Infection in the middle ear once established may follow the usual course as in older children. Complications can follow: acute mastoiditis and even lateral sinus thrombosis and meningitis ; both these latter conditions have been found at post-mortem examinations.

It is probable that infection reaches the mastoid process, or, indeed, the middle ear, through the blood stream in infants more often than in adults.

LATENT OTITIS MEDIA

It is evident that sucklings are unable to explain that they have an earache, so that otitis media easily escapes notice. This has led to the use of the phrase " latent otitis media," and much credit is due to Dr. Le Mée for emphasizing this feature of the disease in sucklings. Latent otitis media is a phrase which has two interpretations. Le Mée regards otitis media as the undiscovered cause of many illnesses in infants. He supports this view ably (*a*) on post-mortem examination of the ears of infants dying from various diseases, as was quoted earlier, and (*b*) on clinical observation.

Krassnig, on the other hand, recognizes a *real* latent otitis media without symptoms. He examined the ears of 290 infants. Of thirty-nine regarded as healthy eight were found to have suppurative otitis media ; incision of the membranes revealed pus, and recovery was rapid. Krassnig also found that among 158 cases of latent otitis media with symptoms forty had no rise of temperature ; in many pain was absent. He points out that deafness cannot be tested. He recognizes also the group of cases of latent otitis media of Le Mée.

THREE GROUPS OF OTITIS MEDIA

Briefly, then, we may consider three groups of cases of otitis media in infants: (1) *obvious* otitis media, with symptoms pointing to the ear ; (2) *latent* otitis media, with no symptoms pointing to the ear—(*a*) *real*, discovered in infants apparently normal ; (*b*) *pseudo*, with (i) general illness, crying, high temperature, and refusal of food, and (ii) diarrhoea and vomiting, so-called *parenteral* ; and finally, (3) *tuberculous* otitis media.

Post-mortem investigation has shown that in the ears of all infants dead as the result of any disease there are signs of infection. Some show only redness and congestion of the tympanic lining ; others, suppuration extending through tympanum, antrum, and mastoid. Lawrence performed necropsies on children dying as the result of diarrhoea and vomiting, and in some cases found otitis media, but no abnormality in the bowels. This investigation has been made in detail in the so-called parenteral otitis media.

Krassnig made a post-mortem examination of fifty-two children among 920 cases seen during a period of nine years. He found four groups of cases: (1) latent otitis media, (2) otitis media and bowel infection, (3) otitis media and mastoiditis, and (4) intracranial complications. The first two groups were latent, and the third and fourth obvious. He argues that intestinal disturbance is a cause of

otitis media because infants admitted for the bowel complaints show normal membranes on examination ; but, if the intestinal treatment is not successful, otitis media of a mild type develops and only clears up when the intestinal symptoms disappear. To refute the theory of intestinal infection from ear infection he quotes cases of bronchitis in which much sputum is swallowed but does not produce intestinal disturbance.

Though a great deal has been written about the combination of enteritis and otitis (parenteral otitis), I submit that too much stress has been laid on this group ; that really it should be considered with latent otitis media ; and that the enteritis is simply the reaction of the infant to the infection.

It is obvious from the foregoing that any case of illness in a suckling should lead to the examination of the ears, preferably by an expert.

SYMPTOMS AND SIGNS OF OBVIOUS OTITIS MEDIA

The first group includes few cases, and really differs in no way from any case of otitis media in older children or, indeed, in adults. Sometimes infants, usually older ones, put the hand up to the ears, roll their head, or knock it on the pillow or side of the cot. This will naturally lead to examination of the ears. Discovery of pus in the external meatus or on the pillow may give the indication of the presence of otitis media. This may have been preceded by some slight symptoms of illness, unaccustomed restlessness and crying, or may be the culminating feature of an illness during which the infant may have exhibited severe symptoms in addition to frequent crying, sleeplessness, refusal of food, vomiting, diarrhoea, loss of weight, and raised temperature, even to 104° and 105°. With the onset of discharge from the ear symptoms subside. The only symptom of note may be high temperature with loss of appetite.

Meningismus may be the first symptom of otitis media. Cases may be diagnosed as tuberculous meningitis, but recover at once on incision of the membrane. In some cases a swelling over the mastoid may be the first sign that otitis media is present. Zygomatic mastoiditis, too, is seen in infants: cases are known in which operation showed cells in the root of the zygoma in infants of 6 months. The youngest patient on whom I have operated for mastoiditis was 7 weeks old.

Examination of the tympanic membrane in infants is not always easy, in spite of the short external auditory meatus. An electric auriscope allows a really satisfactory view of the membranes, and its use may reveal changes otherwise overlooked.

Examination will show in mild cases little change, perhaps absence of the light reflex—Le Mée emphasizes the importance of this sign as an early indication of otitis. In others the usual signs of inflammation, a yellow tinge with or without dilated vessels, redness, and bulging are observed. It is to be noted that bulging of a normal membrane may occur when a child cries, and must therefore be regarded with caution.

Treatment

This follows the usual lines. Incision of the membrane should be carried out at once. Some observers fear that in doubtful cases infection may be introduced by incision, but with ordinary care I do not think this fear should be real. After incision the discharge is wiped away with pledgets of wool and drops of glyc. acid. carbol. and glycerin, equal parts, instilled into the ear. In a few days these are changed to drops of 5 per cent. argyrol. In a simple case recovery follows in one to three weeks. Should raised temperature persist and the child show symptoms of toxaemia, it will be necessary to open the mastoid antrum as in older children. Sometimes local signs of mastoiditis develop, and, if not dealt with, other complications can occur—for example, lateral sinus thrombosis or meningitis.

The importance of speed at the operation is emphasized by all authorities, to avoid shock and reduce the amount of anaesthetic required. When it is remembered that many cases of infantile mastoiditis occur in the course of bronchopneumonia this factor of anaesthetic assumes great importance, as it does in the cases of parenteral otitis, in which the infants are desperately ill. Lierle and Potter wrote on this subject with special reference to the cases of diarrhoea and vomiting. They point out that the mortality is in the region of 44 per cent. to 67 per cent. The causes of death were: bronchopneumonia, 43 per cent.; post-operative collapse, 27 per cent. ; septicaemia, 23 per cent. ; and lateral sinus thrombosis, 7 per cent.

PNEUMOCOCCAL OTITIS MEDIA

This deserves separate mention, since sucklings are especially prone to pneumococcal infection. Hofman found that out of 1,008 cases in children up to the age of 14 years, 440 occurred below the age of 1 year, and 568 in children from 1 to 14 years of age. Among the 440 were 149 cases of acute otitis media, and of the 568, 146 cases. The percentage of suppurative otitis media in cases of infantile pneumonia is thus 33 per cent. in these figures (Hofman), but other observers put the figure much higher—75 per cent., and even 92 per cent. (Preysing). Hofman states that these high figures include mild cases that resolve.

Infection is generally carried by the Eustachian tube through coughing, sneezing, or vomiting, but sometimes by lymphatics or blood vessels. Evidence of lymphatic spread is found in the presence of pneumococci in the soft palate in cases of oedema of the soft palate. In support of blood-borne infection is the fact that emboli containing pneumococci have been found in the brain. The otitis may occur at all stages of pneumonia, or, indeed, may precede it. When it occurs in the early stages it is probably of septicaemic origin. Some observers state that cases of suppurative otitis media, with severe symptoms out of proportion to the local signs, should be suspected to have a central pneumonia, which may declare itself in a few days. *X*-ray examination of the chest may reveal a central pneumonia.

When complications of pneumonia are present the percentage of cases with otitis media rises, and the prognosis becomes more serious ; especially is this the case with whooping-cough. Of twenty infants from 3 weeks to 1 year with pneumonia and whooping-cough and otitis media, eleven died. In some cases of pneumococcal otitis media meningismus may be the first sign of ear inflammation, but, on the other hand, cases of pneumonia exhibit meningitic signs (and pain in the ear) which disappear on recovery from the pneumonia.

LATENT OTITIS MEDIA

This may be divided into (1) real, in which this condition is only found accidentally, as was done by Krassnig in examination of several hundreds of infants, and (2) pseudo ; as has been stressed earlier, in every sick infant the ears must be examined, and any abnormal condition of the membrane should raise the suspicion of otitis media and incision be performed. Sometimes the ears are suspect even though no change can be seen.

In some cases the membrane may show a normal appearance, even though the general symptoms raise the suspicion that the ear is the cause of the illness ; and the subsequent course of the cases proves this to be so. No doubt in these cases the infection is primarily in the mastoid and is a blood-borne infection, perhaps pneumococcal, and the middle ear is secondarily infected.

ILLUSTRATIVE CASES

An Austrian observer had a case of an infant of 6 months, severely ill with high temperature, but showing no physical signs. The tympanic membranes were so nearly normal that he hesitated to open them, but did so; a very little pus escaped. The infant did not improve. He then opened both mastoids, which were found full of pus, and the infant immediately improved.

I had a similar experience with a child just over the infant's age (but this does not affect the case). He had a severe infection, probably influenzal, with a temperature of 103° to 105° for more than a week. A physician was unable to find anything wrong. The tympanic membranes were apparently normal, but nevertheless incisions were made. Even with a magnifying auriscope scarcely any secretion was seen, though twelve hours later a small amount of pus was observed in the meatus. No improvement followed, and twenty-four hours later both mastoids were opened and found to contain pus. Thereafter recovery began. It is almost certain that the mastoid suppuration was present before any otitis media, and infection may well have arrived via the blood stream. In support of this is the fact that the child had a low red cell blood count and only 6,500 leucocytes, suggesting the resistance was much lowered. It is possible this was a pneumococcal case.

The second group of pseudo-latent cases are those associated with diarrhoea and vomiting. This parenteral otitis media is to be dealt with by a subsequent speaker. I propose, therefore, only to quote a case which has recently been under my observation and which illustrates some of the typical features.

An infant of 9 months was admitted to Guy's Hospital on account of diarrhoea and vomiting. It was said to have had otitis media, from which it recovered fourteen days before admission. Diarrhoea and vomiting began one week later. The child was very ill and wasted. In the stools were found *Bacillus coli communis* and *Streptococcus brevis*. Twelve days after admission the left ear discharged pus. The following day examination showed the right membrane bulging; incision released pus, but no improvement followed. Therefore on the following day both mastoids were rapidly opened; the left one contained pus, the right antrum a little muco-pus only. The infant survived four to five days.

Post-mortem examination showed bronchopneumonia, follicular enteritis, and colitis, as well as the presence of pus in the mastoids, as at operation. No doubt the serious condition of the child led to concentration on treatment. Only discharge of pus from one ear led to examination of the ears. Even though the anaesthetic given was minimal, bronchopneumonia supervened.

TUBERCULOUS OTITIS MEDIA

It is always stated that this disease is common in infants. One observer (Logan Turner) stated that of cases of otitis media in infants under 1 year, 50 per cent. were tuberculous; others state that tuberculosis accounts for a large percentage in infants. Mygind, in 1922, in a review of 1,000 mastoid operations, found that in only 1.4 per cent. of the children were tubercle bacilli present in the pus, but considered that this figure greatly underestimated the frequency in children. All are agreed that when tuberculous otitis media does occur the prognosis is much better in the healthy than in the unhealthy. In my experience tuberculosis of the middle ear is not common in infants, and I suggest that it is a tradition to state it is so common. There is, of course, the possibility that it is getting less frequent with improvement in living conditions.

Tuberculous otitis media causes extensive destruction of the temporal bone; the facial nerve becomes involved; the labyrinth is attacked; and the glands about the ear enlarge and may break down. Sometimes both ears are affected, and double facial paralysis results. Operation may disclose so much disease that the dura mater is exposed and the labyrinth has become a sequestrum. On one occasion removal of the cochlea was followed by a flow of cerebro-spinal fluid from the internal auditory meatus and continued for ten days; it then ceased, and the child made a good recovery. Infection is no doubt generally from milk, but not always so, since cases are seen in breast-fed infants, even with healthy mothers.

When tuberculous otitis media is diagnosed a thorough mastoid operation should be performed, and gives a very good prospect of recovery.

SENESCENCE *

BY

G. P. BIDDER, Sc.D.

Men, dogs, and horses show with age symptoms whose onset is conveniently called senescence; water voles, female plaice, sea anemones, and the bath sponge do not show senescence. I have suggested that senescence is the after-result of the mechanism which secures specific size.†

Minot concluded all cells to be senescent until they are rejuvenated by increase of nuclear substance, as effected in the ovum dividing after fertilization; the daughter cells subsequently increase cell body and return to senescence. Child writes (*Senescence and Rejuvenescence*, 1915, p. 460): "When the organism is adding to its structural substance, and transformation from more active to less active physical and chemical conditions takes place, senescence occurs"; he conditionally approves (p. 275) Minot's statement, "the rate of senescence is highest in youth and lowest in advanced life." Both views appear contradicted by the British Museum section of a giant redwood, felled with 1,335 rings of healthy wood, and by the giant cypress of Mexico (*Kew Bulletin*, 1922, p. 199), producing annual leaves and fruit in vigour, unimpaired by 5,000 years of cell division. Woodruff's paramecium culture has divided for more than twenty-one years without conjugation. Carrel's seventeen-year-old culture of cells from a chick heart, following Loeb's experiments on tumours, convinced Raymond Pearl (*Biology of Death*, p. 30) "that death is not a necessary inherent consequence of life in the somatic cell."

Pseudo-senescence and pseudo-specific size are often mere consequences of the decrease in ratio of surface to volume as size increases. Bath sponges stop growth at about thirty inches diameter, but grow on vigorously if divided with a knife into four-inch cubes (L. R. Crawshay, *Reports on Sponge Fisheries*, Colonial Office, 1925 *et sqq.*). Having no nervous system, interior cells cannot be rejuvenated by the knife. The flagellate cells must always draw in water through the surface and eject it through the large holes; with increase in size the relative diminution in surface requires higher velocity to feed the sponge, lengths of all channels are increased, and consequent friction becomes more than the flagella can overcome. Vegetative masses, aggregates of protozoa, tumours—all tend to be limited in size by necrosis of parts far removed from the surface.

For Child (p. 438), "biological importance of the relation between surface and volume rests rather upon a process of logic than upon the data of observation." But he records valuable experiments on change of size in flatworms, showing that rate of metabolism is always more rapid for the smaller worms. Analysis of his results shows that rate of metabolism varies inversely as length of the animal. His experiments prove, therefore, that rate of metabolism varies as ratio of respiratory surface to volume of tissue.

* Paper read in opening a discussion in the Section of Comparative Medicine at the Centenary Meeting of the British Medical Association, London, 1932.

† *Proc. Linn. Soc.*, 1925, p. 17, and 1926, p. 19; *Nature*, 1925, cxv, 156; British Association Report, 1927 (Leeds), p. 64.

May progressive retardation of cell division in the larva be due to multiplication of cell walls impeding transference of oxygen and food? Measurement of senescence by interval of time between cell divisions leads to strange paradoxes about the newborn babe,† whose brain cells never divide again, while the epidermis continues rapid division for eighty years. Considering Calkin's (1926) view of endomixis, it seems strange that paramecium cannot live a day without rejuvenescence by rearrangement, while brain cells which govern this country have lived so for 20,000 days. I suggest that we were not born with infinitely senescent brains and rejuvenated epithelium; rapidity of division in our skin has been evolved to keep it clean and whole; undivided brain cells have been evolved because their function is to remember.

Child (p. 302) writes, with what seems inconvenient use of words, of the insects and fish whose death follows first extrusion of sexual products, that "the organism is undoubtedly in an advanced stage of senescence when sexual maturity is attained." The tissues of the Pacific salmon have come into being to be converted into reproductive cells—the conversion is essential to survival of the salmon's progeny; the moment of its fulfilment is climax of the parent's life. Senescence in man did not conduce to survival of our early ancestors, and it is the anticlimax of our life. *Parental death* (*Nature*, cxv, 495), as aim and purpose of somatic life, is ancient and historic "natural" death. We will recall briefly stages of its evolution in various lines of descent.

Fission of a protozoon results in two living protozoa; but encystment and spore formation ends in escaping spores leaving an empty spore case, inside which often residual protoplasm adheres: this is the first somatic corpse. Among sponges, Grantia in midsummer at Plymouth is full of embryos almost ready to escape; each escaping larva tears the flagellate epithelium; the tattered and exhausted maternal remains disappear: September's rocks show only numerous minute young sponges (*Q.J.M.S.*, xxxviii, 11). Similar parental death awaits proglottides of the tapeworm, but here the cast-off envelope of the undying protozoan ova has reached metazoan grade. Higher still in grade are the swollen bodies of marine worms, and ephemeral imagines of insects; and very interesting parental deaths are those of the eels. Johannes Schmidt discovered how the common eel leaves our ponds and crosses the Atlantic to spawn and die in the western sea of its origin. Flower (*Proc. Zool. Soc.*, 1925, p. 259) states that it lives fifty years when prevented from doing this; the degeneration of tissues is therefore *not* caused by bodily senescence, but by the sexual crisis. Cunningham (*Journ. Mar. Biol. Assoc.*, 1892, ii, 29) studied this crisis in conger eels: when the gonads begin ripening, the conger, male or female, ceases feeding for six months; the ovary swells, while viscera, muscles, bones, and teeth degenerate; a scalpel cuts through the whole skull like cheese. Cunningham found no ovary weighing more than 0.22 of the gravid weight, but he quotes records of ovaries forming 0.35 and 0.46 of the gravid weight. The figures suggest that a vertebrate cannot continue to live after the loss of some 40 per cent. of the substance of the body.* Pacific salmon show similar increase of the gonads at the expense of mortal degeneration.

For preservation of the species there has been evolved this process, by which each soma shall accumulate for the species from food as much capital as is possible. This capital shall not be continuously risked on the chances attending one life, but when sufficient has been accumulated it shall be distributed, so that, with differing accidents, probably two of the offspring may survive to continue the race. Yet the processes above reviewed are primitively wasteful of the property of the species, since three-fifths of the capital is lost in the parental corpse. We know many other species which receive further advantage from evolution of processes economizing this loss.

In fresh-water sponges many encased gemmules winter in the ruins of their parent; with spring their issuing amoeboid cells grow up in a coalescing mass which envelops and utilizes the maternal skeleton (Potts, *Fresh Water Sponges*, 1887, pp. 215, 259; Carter, *Journ. Bombay Branch Roy. Asiatic Soc.*, 1849, xii,* 45). Many female spiders economize somatic tissues of the male, for his offspring, by eating him. When the Atlantic salmon ascends our rivers to spawn, tissues are degenerated for benefit of the gonads almost as in his Pacific cousin; but the spent body does not completely die, and, half swimming, half drifting, reaches the sea, feeds again, and in a few years returns much grown, with very much larger gonads (never over 30 per cent. of total weight); after other years it may return a third time. Comparison is obvious with annual plants, some strains of which grow from the root a second or even a third year, but in the salmon the whole parental envelope is economized.

Male plaice are fertile at 5 or 6 years old; not being caught above 8 years old (Wallace, *Fishery Investigations*, 1914, Ser. ii, vol. ii, p. 12) they probably die after spawning, not always after first spawning. Their economy is unimportant, since plaice do not pair. Parental death has disappeared in the valuable female. She matures at 6 or 7 years old; at 25 (some 55 years old for humanity) she is 70 per cent. longer and five times heavier; plaice of unknown age are recorded up to twelve times average weight at first maturity, and over twice the length.† We have no evidence of her senescence, nor of any cause of death except violence. Her species seems to have achieved the perfect economy of an undying and ever-fertile parental envelope.

Mammals, like the female plaice, have lost parental death, but the parental envelope is not undying. Man only grows about 18 per cent. in length and 75 per cent. in well-trained weight after puberty, shrinking in both after twice that age at a rate which increases every year. In sea or land the most natural animal death is to be killed and eaten; but adult wolf or primitive man lives in increasing danger of feeding a *younger* adult of his own species; adult cod or squid live in diminishing danger of being eaten by older adults of their own species. In water cannibalism by the old, rare specific size, and rare senescence contrast on land with cannibalism by the young, general specific size, and frequent senescence. Are not these differences correlated?

Galileo (vide D'Arcy Thompson, *Growth and Form*, p. 21) showed it impossible for a swiftly moving animal on land to increase its size in the same proportion of parts and to maintain its agility. Lankester (*Comparative Longevity*, p. 37) quotes Herbert Spencer's statement of this principle: increase in size increases weight as the cube of the length, but areas of cross-sections of muscles

* Rugen and Stoessiger, (*Annals of Eugenics*, 1927, p. 76) give statistics of muscular strength, nervous control, and breathing capacity, from which I suggest the conclusion that the organs of exceptionally well-preserved men of 80 contain about 35 per cent. less protoplasm than they did at 27, indicating that with loss of 40 per cent. of its protoplasm the human body cannot resist minimal accident. Child's Planaria lost 99 per cent. without injury, showing a compensatory advantage for races which have refused the support or protection of a skeleton; they survive starvation by resuming infantile size.

* Misprinted "iii" in Vosmaer's *Bibliography of Sponges*.

† Since growth in plaice depends entirely on quantity of nourishment, it appears likely that a limiting size may be reached when area of gut surface is only sufficient to nourish mass of body, and cannot provide for increase. Rubner's experiments (quoted by Child, p. 272) suggest that this relative reduction of feeding surface may explain much slowing down in growth as size increases, and some pseudo-specific size.

and bones only as the square of the length ; so that, if an animal doubles its length without alteration of proportions, " its ability to overcome forces has quadrupled, the forces it has to overcome have grown eight times as great." " But," writes D'Arcy Thompson, " as Galileo also saw, if an animal be wholly immersed in water, . . . then the weight is counterpoised to the extent of an equivalent volume of water. . . . Under these circumstances there is no longer a physical barrier to the indefinite growth in magnitude of the animal."

Giant trees, cultures of chick cells and of paramecium, measurements of plaice and of sponges, all indicate that indefinite growth is natural. Galileo proved it fatal to swiftly moving land animals, therefore swiftly moving mammals and birds were impossible until their ancestors had evolved a mechanism for maintaining specific size within an error not impairing adequate efficiency. Even without evidence of ever-growing organisms, we could not suppose that the close correspondence to specific size, which we see in all swiftly moving creatures of earth or air, results from mere " senescent " fading-out of the zygotic impulse to cell division and cell increase. Specific size is probably most important to birds, with their aeroplane mechanics strictly enjoining conformity of scale to plan ; but to men it is most noticeable in man. Only familiarity prevents marvel at the rarity of meeting a man more than 20 per cent. taller or shorter than 5½ ft., or of discovering his remains in any place, of any race, of any epoch. Probably our erect posture enforces accurate proportions of length to weight, for running.

Adequate efficiency could only be obtained by the evolution of some mechanism to stop natural growth so soon as specific size is reached. This mechanism may be called the regulator, avoiding the word " inhibitor " so as not to connote a physiological assumption. However ignorant we are of its nature, its action is traced in anthropometric statistics: a steady diminution in growth rate from a maximum at puberty to vanishing-point in the twenties. That the regulator works through change in the constitution of the blood is shown by the perpetual division of Carrel's chick cells in embryonic plasma, whereas cell division is ended in the heart of a hen.

I have suggested that senescence is the result of the continued action of the regulator after growth is stopped. The regulator does efficiently all that concerns the welfare of the species. Man is within 2 cm. of the same height between 18 and 60, he gently rises 2 cm. between 20 and 27, and still more gently loses 1 cm. by 40 or thereabouts. If primitive man at 18 begat a son, the species had no more need of him by 37, when his son could hunt food for the grandchildren. Therefore the dwindling of cartilage, muscle, and nerve cell, which we call senescence, did not affect the survival of the species ; the checking of growth had secured that by ensuring a perfect physique between 20 and 40. Effects of continued negative growth after 37 were of indifference to the race ; probably no man ever reached 60 years old until language attained such importance in the equipment of the species that long experience became valuable in a man who could neither fight nor hunt. This negative growth is not the manifestation of a weakness inherent in protoplasm or characteristic of nucleated cells ; it is the unimportant by-product of a regulating mechanism necessary to the survival of any race of swiftly moving land animals, a mechanism evolved by selection and survival as have been evolved the jointing of mammalian limbs, and with similar perfection.

(NOTE.—Though Galileo's law is the usual cause of the evolution of specific size, with consequent senescence, there are other causes. Mrs. Sexton, of the Marine Biological Association, told me that in her sand-hopper cultures both females and males eventually stop breeding and growing, and die of old age. Probably many animals which move in shoals have specific size, because the largest are selected for death by the animals which prey on them. An animal which preyed exclusively on Gammarus, one by one, would also have specific size ; Lankester (loc. cit., p. 41) points out the advantage of small size to a species which feeds on small things singly. Whales have specific size (*Proc. Linn. Soc.*, 1925, p. 18), possibly related to their feeding, possibly inherited from their active flesh-eating land ancestors.)

THE EXPERIMENTAL STUDY OF SENESCENCE *

BY

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Conclusive evidence regarding problems of senescence is very scarce. This is mainly due to the fact that most of the numerous experiments which have been performed deal with isolated cases, few workers having had the opportunity of carrying out observations and experiments on a group of animals sufficiently large and sufficiently homogeneous to permit the collection of decisive data.

ANIMAL STOCK USED

At present such an opportunity exists, and is used to some extent, in this laboratory. The present writer imported, three years ago, some pairs of Wistar rats from which a " standard " stock was bred. Most of the stock, which is maintained at a strength of approximately 3,000 animals, has been derived from one ancestral pair by continuous litter-brother by litter-sister mating. The rest of the stock is as highly inbred as the sex ratio of the litters of the early generations permitted. The environmental conditions are kept as constant as possible, the animals being housed in standard cages in a special building fitted with thermostatic central heating and a cooling device. No artificial selection has been applied to the stock. The control half of the stock is permitted to die off without interference save in certain cases such as mammary tumours, which are very frequent in our colony, bites, skin and hair parasites. Individual records are kept of all stock animals, the cages being examined daily.

The stock was used during the last two years for a number of endocrinological, nutritional, and behaviour experiments. The Edinburgh stock has in common with the original Philadelphia stock certain advantages and shortcomings. Early growth is rapid, mortality during the first eighteen months of life is low, and resistance to infection high ; on the other hand, emaciation after the eighteenth month of life is frequent, when many animals die without showing consistently specific pathological changes. Also, the duration of life, both average and maximum, appears to be rather short.

It will not be possible to publish adequate vital statistics or conclusive experimental data before the end of 1933 ; at present only a few preliminary notes can be given, and it will have to be remembered that these notes refer to animals of the first generation. It will have to be taken into account that the animals of successive generations are not absolutely comparable with each other since the degree of inbreeding obviously increases with each generation, and it remains to be determined to what extent this factor influences the mortality rate and other important characteristics. The oldest age observed in the male was 1,004 days, in the female 982 days. This is considerably below the maximum ages recorded by previous breeders.

* Read in opening a discussion in the Section of Comparative Medicine at the Centenary Meeting of the British Medical Association, London, 1932.

WHAT IS SENESCENCE?

When speaking of observations and experiments on senile rats, or for that matter on any other animal, it would seem necessary to define clearly what is meant by the term "senile." The literature does not contain any satisfactory definition. In most cases unsatisfactory external appearance combined with comparatively old age, dysfunction of the sex organs, and similar characteristics were used as an indication of senility. But observations on our stock show that these characteristics are not strongly correlated with each other, and the problem of what constitutes senescence is as complex in the rat as it is in man. It is found, for instance, that about half of the aged animals (which have already lived beyond the age of 24 months and have only a small expectation of life) did not show external signs of senescence such as were described by previous authors as typical for the aged rat. In many of these aged animals the external appearance continued to be satisfactory—the fur was in good condition, posture reflexes were apparently normal, though no quantitative analysis has as yet been carried out. Such animals die quite suddenly without having undergone any apparent phase of senescence. No consistent cause of death was found.

In other animals senescence was manifest and changes similar to those described by Steinach were observed. The animals were sluggish, uncertain in their movements, their posture reflexes were very slow, their general activity was greatly reduced, respiration was irregular, the eyes were pale, and the fur was thin and not cleaned. These changes constitute a gradual biatrophy and may develop at any time between the twenty-second and thirtieth month of life, and continue sometimes for two or three months. Several days to a fortnight before death some animals refuse food but drink readily. No consistent cause of death was found.

These two "types" of ageing involving presence or absence of manifest senescence respectively are not sharply defined, and are, of course, distinguishable only by subjective observation. It is found, however, that the weight curves of the animals endorse the subjective impression. The more manifest senescence is, the more definite is the downward trend of the weight curve. In animals without manifest senescence the weight curve remains more or less "plateaued" until very shortly before death, when either a sudden steep fall or else, surprisingly enough, a sudden and rather steep rise occurs.

The two types which may be roughly distinguished include both males and females. Yet preliminary observation indicates that senescence becomes manifest more readily in the female than in the male.

INFLUENCE OF THE GONAD

Most of the authors concerned with the problem of "reactivation" of the senile organism seem to imply that atrophy or dysfunction of the gonad is necessarily involved in the syndrome of senescence. Some regard the generation of gonadic function as a criterion of senility. This assumption certainly cannot be maintained with respect to our stock.

(*a*) *Testicular Function in "Non-Senile" Aged Males.*—To refer to males first, it is found that aged males which do not exhibit manifest senescence may continue to show spermatogenesis and functional seminal vesicles. (The condition of the seminal vesicles can safely be regarded as an indicator of testicular secretion.) On the other hand, several cases of aged but not manifestly senile males were recorded in which the testicles had ceased to produce spermatozoa and were apparently greatly reduced in size and in endocrine function.

(*b*) *Testicular Function in "Senile" Aged Males.*—Similar conditions were found in aged males showing very manifest signs of senescence. Thus spermatogenesis and internal secretion can continue or else be absent (or practically absent) in obviously senile males. Moreover, three cases were recorded in which the testicles of animals obviously and manifestly senile seemed almost atrophic (small, flaccid, and of purplish colour), while the seminal vesicles of these males were the largest the present writer has ever observed in any rat of any age. Microscopically the testes were found to consist of interstitial tissue, containing Leydig cells and unspecified elements, and of empty tubuli.

(*c*) *Ovarian Function in Aged Females.*—As to the female, conditions resemble those found in the male. Fertility ceases in the females of the Edinburgh stock about the eighteenth month of life. The maximum age of fertility was 26 months (one case). Sexual periodicity (oestrous cycle) continues for varying periods after fertility has ceased; thus many animals will mate without becoming pregnant or pseudo-pregnant. The presence or absence of oestrous periodicity is certainly not absolutely correlated with the manifest appearance of the animal. Females of the senescent type may come in oestrus regularly; aged females of the non-senescent type may not come in oestrus at all. In some cases the signs of oestrus were found shortly before death in rats which died after a period of manifest senescence at ages varying from 27 to 28 months. In most cases necropsy or biopsy revealed a state of the ovary and uterus corresponding to the observations on the oestrous periodicity. Animals which showed oestrous periodicity had, as a rule, well-developed ovaries and uteri—this applies to an animal which died at the age of 29 months and was manifestly senile. On the other hand, the findings in animals which did not come into oestrus differed. In some of them the ovary was of senile appearance, consisting mainly of a stroma of small unspecified cells and of small follicles (mostly of distorted shape) lying peripherally. Kariolysis of the ova was observed. In other cases, however, a phenomenon was observed which cannot yet be explained. The ovaries in these cases were of normal gross and histological appearance, while the uterus appeared to be very thin and showed glandular atrophy histologically, low cubic to columnar epithelium, and general signs of degeneration, such as were described previously. In a number of aged females of senile appearance which showed no oestrous periodicity the ovary was found to be of normal appearance, but the uterus was distended by blood or a fluid of low viscosity, stained dark by blood pigments. This is the only pathological finding made in comparatively numerous cases.

CONCLUSIONS

The observations briefly summarized in the preceding paragraphs show quite clearly that senescence is not absolutely correlated with absence of ovarian or testicular function, and that it can develop even in males in which excessive testicular secretion may be assumed to exist in view of the very prominent development of the accessory genital glands. Conversely, aged animals may preserve a satisfactory general condition although gonadic function is reduced. Whether any correlation between ovarian and testicular function on the one hand, and the general condition of the organism and duration of life on the other, does exist will be determined when the complete data are available.

In a number of aged males and females (all more than 24 months of age) in which ovary and testicle were found to show senile changes at biopsy and where the absence of oestrus or the condition of the accessory glands indicated reduction of endocrine gonadic function, one gonad

was removed for histological purposes, and the state of the genital organs was ascertained as far as possible. In six animals which were examined at a later date again it was found that no compensatory hypertrophy had occurred. Fourteen of the animals were subjected to experiments with gonadotropic hormones (*p*-factors, prolans) prepared in most cases from pregnancy urine by a method published previously, and in three cases anterior lobe grafts were given. It was found that within eleven to twenty-one days restitution of gonadic function occurred. Corpora lutea were found in the ovaries, and the uteri of these animals were found to be of functional appearance.

As to the testicle, the findings varied. Slight or pronounced enlargement of the testicle was found in six cases. All animals save one, which died during the treatment, showed a definite enlargement of the seminal vesicles. The histological findings differed considerably. In four animals spermatogenesis, which was found to be absent in the control testicle removed before the injections started, had recurred in the remaining testicle. This result cannot be easily reconciled with our general knowledge regarding the influence of gonadotropic hormones upon the testicle, since experiments carried out in this laboratory and elsewhere have failed to establish spermatogenesis as an effect of gonadotropic hormones. In the remaining cases the histogenetic influence of the injections upon the testicle was slight and apparently restricted to the interstitial tissue ; this is in accordance with findings on prepuberal or pubescent animals. The influence of the injections upon the general condition of the animals was not marked, although it seems that in a few cases an improvement in the general condition occurred ; in the remaining animals no distinct influence was manifest.

The experiments so far conducted show, in accordance with previous findings, that the senile gonad can be reactivated, at least in some cases. The senescence of the gonad seems to be due to the lack of the specific stimulating factor represented by the gonadotropic hormones of the anterior lobe, and not to any general condition of the organism or to the absolute age of the gonad itself. It is difficult to reconcile with these conclusions observations which claim that interference with the testicle itself led to a reactivation of testicular secretion, since the deficiency is one of extra-gonadic factors. However, further experiments with vaso-ligature and similar methods are in progress. The experiments with injections of gonadotropic extracts are also repeated on a larger scale so that any existing influence on duration of life should be detected.

Growth and Senility

In view of the fact that no absolute correlation between gonadic function and the senescence of the organism as a whole was manifest, it seemed desirable to examine the relation between general functions and senescence. The investigation of growth in relation to senescence suggests itself. Growth may be regarded not as an incidental attribute of the early phases of life, but as an essential condition of what, for the present, one might call "youth," whether the latter be defined statistically (expectation of life) or biologically (by reference to the intensity of functions, efficiency of the organism as a whole, etc.).[1]

Experiments with the injection of growth-promoting extracts from the anterior lobe into aged animals were therefore arranged. The extracts used were either prepared by the ammonia method (Wiesner and Sheard) and contained gonadotropic hormones or else were free of the latter, the method of van Dyke and his colleagues being used. So far the experiments have shown that many senile animals can react with considerable growth to the administration of growth-promoting extracts. In the meantime the increase in weight is taken as the sole indicator of growth. This is permissible in the absence of pathological conditions such as anasarca or obesity ; any error introduced by the use of the weight curve as an indicator of general growth will, it is hoped, be corrected by *x*-ray records to be taken in future experiments.

It appears that in some cases the administration of growth extracts had a beneficial influence upon the general condition of the rat. At present the mortality rate of the experimental male group is only half that of the uninjected special control group, while no significant differences between respective mortality rates of the experimental and control females have occurred. Yet it will remain impossible to draw any definite and reliable conclusion before the groups will have died off.

It need hardly be emphasized that the observations briefly related above represent only a few preliminary notes. Our observations, however, may serve as indicating lines of further research. It is hoped that by the end of the coming year the number of experiments on aged animals will be sufficiently large to permit more definite conclusions. Also, experiments undertaken by the writer's colleagues will probably yield some more objective data as to changes occurring in old age and the reaction of the senile organism to the administration of gonadotropic and growth-promoting extracts.

The writer would like to express his gratitude to Miss N. M. Sheard, who is superintending the rat colony, and to Mr. T. B. Macaulay, LL.D., whose generosity made it possible to build up and maintain the colony.

[1] To regard growth as more than a mere epiphenomenon of youth seems justifiable from a general biological point of view ; the classical experiments of Hartmann on the immortalization of Planaria may be mentioned in this context, and particular reference may also be made to the point of view developed by Ehrenberg, according to whom the term "growth" may be taken in a wider sense than the usual one which implies actual increase in size.

ANEURYSM OF ABDOMINAL AORTA AND THROMBOSIS OF SUPERIOR MESENTERIC ARTERY ASSOCIATED WITH A BULLET WOUND OF THE LUNG

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The case recorded below has considerable medico-legal interest in respect to the establishment of a causal relation between the passage of the bullet and the formation of the aneurysm. There is no evidence of syphilis as an aetiological factor, neither does the site of the aneurysm nor its form correspond with those of an atheromatous lesion. In any case the abdominal aorta is a rare site for spontaneous aneurysms, and since the lesion present corresponds in type to a traumatic aneurysm, one is forced to the conclusion that the latter diagnosis is correct.

Case Record

The patient, an ex-soldier aged 45, was admitted to the Royal Victoria Infirmary, Newcastle-on-Tyne, at 1.30 p.m. on July 24th, 1931, suffering from an "acute abdominal crisis" of thirty-six hours' duration, with a diagnosis of intussusception. He had been taken ill thirty-six hours previously with pain in the epigastrium, nausea, and vomiting, and had been treated medically for gastro-enteritis. The bowels had been opened several times during the attack and

blood had been passed in the stools. On admission, the patient was profoundly collapsed and was found to be suffering from general peritonitis, but there was nothing definitely pointing to intussusception. His condition precluded operative interference, and he sank rapidly and died nine hours after admission.

PREVIOUS HISTORY

This was obtained after death from hospital records, etc. On February 2nd, 1916, the patient was on active service in France and was struck by a bullet in the epigastric region. He remained for five days in a C.C.S. During this time he was too ill to be evacuated. "His abdomen was very swollen and he could only take sips of water." He was later transferred to the Norfolk War Hospital, where he remained for thirty-nine days. The records show that he suffered from a G.S.W. of chest with entry to the left of mid-line over the sternal end of seventh rib. *X*-ray examination showed a bullet lying between the tenth and eleventh ribs on the right side, close to the spine. There were no symptoms or signs of pulmonary disease. He was eventually discharged to light duty. Between 1916 and 1921 he came before various Medical Boards complaining of dyspnoea and pain in the chest, but no evidence of pulmonary disease could be found. His incapacity assessment was 30 per cent. At an examination on February 10th, 1921, breath sounds were found to be diminished over the right base and there was increased tactile vocal fremitus and vocal resonance on the right side. A year later he still complained of cough, dyspnoea, and of being easily fatigued, and although physical examination proved negative the Board was of opinion that the diaphragm had been injured and that it was this injury which was causing the symptoms. In March, 1923, the same complaints were still present but physical signs were equivocal. An *x*-ray examination showed the bullet clear above the diaphragm, the shadow being seen in the lateral view, moving with the diaphragm. The depth from the front was 3 to 4 inches and from the back $2\frac{1}{2}$ to 3 inches. There was possible injury to the eleventh dorsal vertebra (the final opinion of the Ministry of Pensions was that the more accurate description of the bullet's level would be between the eleventh and twelfth dorsal vertebrae).

The only other points of importance in the patient's medical history were hypertension, with accentuation of the second aortic sound and slight albuminuria (1924), abscess in arm (1924), renal colic with haematuria and passage of calculus per urethram (1928), and "cold" and neuritis complicated by pyorrhoea (1930).

PATHOLOGICAL INVESTIGATION

A necropsy was performed on July 27th, 1931, at the request of the coroner. The following is an abstract of the findings:

No scar was visible in the left epigastric region. There was no pericarditis. Beyond some dilatation of the right auricle, slight hypertrophy of the left ventricle, slight nodular atheroma of the first part of the aorta and coronary arteries, and toxic changes in the myocardium, the heart showed nothing abnormal. The right pleural cavity was obliterated by dense adhesions, and the right cupola of the diaphragm was adherent to the lung base. Midway between the anterior and posterior borders of the lung at the base and immediately beneath the pleura a bullet was found embedded in the substance of the lung, with the nose pointing in an antero-lateral direction. On section, the lung showed terminal passive congestion and oedema. There was no consolidation. The left pleural cavity and left lung appeared healthy save for terminal passive congestion and oedema at the lung base.

A considerable amount of blood-stained effusion was present in the peritoneal cavity. The stomach and intestines were distended with gas and fluid. The coils of small intestine and the right half of the transverse colon showed marked congestion and subperitoneal haemorrhage, with a fibrinous exudate on the surface. In places, the small intestine was plum-coloured. Extending between the origin of the superior mesenteric artery and the right crus of the diaphragm was a saccular aneurysm of the aorta about the size of a walnut. The under surface of the sac was densely adherent to the tissues anterior to the lumbar vertebrae, there being much scar tissue present in this region. On opening the aorta the orifice of the sac was found to be 1 cm. in diameter, and was situated on the posterior wall of the aorta towards the right side. The lips of the orifice consisted of dense scar tissue. On dissection of the superior mesenteric artery its lumen was found to be occluded by ante-mortem thrombus. The other branches of the coeliac axis and the inferior mesenteric artery were healthy, as was the inferior vena cava and its main tributaries. The intima of the aorta showed a moderate amount of nodular atheroma, but there was no gross evidence of syphilis. At the bifurcation of the aorta a large ante-mortem thrombus was found, which extended into the common iliac arteries as far as their bifurcation. The spleen, pancreas, liver, suprarenals, and right kidney showed only changes attributable to toxaemia and post-mortem change. The gall-bladder and bile ducts were healthy. The left kidney was enlarged and showed advanced simple hydronephrosis, the structure corresponding to dilated calyces associated with a thin rim of cortical tissue. The calyces contained clear urine and a few small calculi. The left ureter was thickened and dilated, and a medium-sized calculus was impacted at its lower end, completely blocking the lumen. The right ureter, urinary bladder, and prostate showed nothing abnormal. There was no evidence of injury or disease in the skull or brain.

Anatomical Diagnosis.—Lodgement of bullet in right lung, aneurysm of abdominal aorta, thrombosis of superior mesenteric and common iliac arteries, infarction of small intestine, calculous hydronephrosis.

Histological examination of the following tissues was carried out.

Heart.—There was no evidence of acute or chronic inflammatory change. The circumflex branch of the left coronary artery showed slight musculo-elastic medial hyperplasia and some intimal thickening.

First Part of Aorta.—There was no thickening of adventitia or media and no endarteritis or perivascular cuffing of the vasa vasorum. There was no fibrosis of the media and a normal amount of elastic tissue was present. The intima showed slight atheroma.

Aneurysmal Sac.—There were small collections of lymphocytes in the adventitial region. The wall of the sac consisted of mature collagen with a fair amount of elastic tissue. There was no vascularization or cellular infiltration. No trace of intimal tissue was seen. The contents of the sac consisted of ante-mortem thrombus without evidence of organization, and some post-mortem coagulum.

Right Common Iliac Artery.—There was some fibrous thickening of adventitia and media with atheromatous change in the intima. The lumen contained mixed thrombus without evidence of organization.

Base of Right Lung.—The pleura was grossly thickened, the appearances being those of mature scar tissue in which a few large vessels and small collections of lymphocytes were present. The underlying lung showed areas of oedema and collapse alternating with emphysematous areas. The larger vessels showed some endarteritis and the alveolar capillaries were congested. There was considerable hyperplasia of the fibrous stroma of the lung, and at the site of the bullet mature scar tissue and foci of histiocytes were present.

Right Kidney.—Apart from toxic and post-necrotic changes and the occurrence of a few fibrosed glomeruli, the renal tissue was healthy. There was a slight degree of arterio-sclerotic thickening of the main branches of the renal artery.

Left Kidney.—This showed similar appearances except in the neighbourhood of the distended calyces, where there was marked glomerular and tubular atrophy associated with diffuse fibrosis and large foci of histiocytes. The transitional epithelium of the calyces had been replaced by scar tissue.

DISCUSSION

Since a period of fifteen years elapsed between the original wound and death, accurate determination of the exact course of the bullet must be largely a matter of conjecture, for reparative processes might reasonably be expected to

be very complete. We are of opinion, however, that the bullet took a downward and backward course after its entry and passed *below* the diaphragm, after which it struck the spinal column, and passed through the diaphragm on the right side. The symptoms from which the patient suffered while at the C.C.S. might be interpreted as being due to injury to the liver and haemothorax, and although no positive evidence as to the former was found at necropsy, the pleural adhesions present on the right side might be attributable to spontaneous cure of the latter condition. The various findings of the Boards certainly suggest diaphragmatic injury, and with regard to the *x*-ray appearances the site of the bullet between the eleventh and twelfth dorsal vertebrae, with possible injury of the eleventh dorsal vertebra, affords corroborative evidence of our suggestion as to the path of the bullet. Moreover, since the aneurysmal sac extended between the origin of the superior mesenteric artery and the under surface of the diaphragm on the right side, its site corresponds to the lower half of the twelfth and the upper half of the first lumbar vertebra. This point is sufficiently near the final position of the bullet (in the right lung base immediately above the diaphragm) to indicate an association between the path of the bullet and the aneurysm. As to the exact nature of the injury which the aortic wall must have sustained, one is left in considerable doubt, and it is remarkable that in the circumstances damage to either aorta or inferior vena cava did not result in rapid death. Since this did not happen, the formation of an aneurysm may have been due to: (1) grazing injury to the aortic wall such as might be produced by (*a*) the passage of a bullet, (*b*) a dislodged spicule of bone ; or (2) inflammatory reaction in the track of the bullet. The combination of cicatricial weakening from the injury and the intra-aortic pressure would necessarily lead to a progressive local dilatation of the aorta.

We sent the bullet to Professor Sydney Smith of the Forensic Medicine Department of Edinburgh University, to whom we are indebted for the following report:

"It is a Danish bullet composed of a lead core with steel and nickelled casing. It was fired from a German rifle. It was not a direct hit but was a ricochet, having struck a hard surface before it hit the victim. This would give it a more eccentric course and would explain its direction in the body. After entering in the region of the seventh rib to the left of the middle line, it no doubt struck the aorta a glancing blow, which caused a certain amount of bruising ; then passed between the pillars of the diaphragm into the chest cavity. The damage to the wall of the aorta would lead to fibrosis and stretching."

We are unable to account for the clinical latency of the condition with regard to dislodgement of portions of thrombus from the sac, which might have occurred at any time and ultimately caused death. The condition of calculous hydronephrosis, which was present, was apparently an entirely separate pathological process, and can be associated neither with the bullet wound nor with the final illness.

OBSERVATIONS ON THE TREATMENT OF TETANUS

*(WITH SPECIAL REFERENCE TO TETANUS ANTITOXIN)**

BY

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My purpose in dealing with this subject is not to describe any new method of treatment or to claim any startling results, but to take stock of the present situation regarding the various methods of treatment advocated and of the methods tried in this group of cases. A continuous charge of the male tetanus wards for five years has enabled me to observe a fairly large number of cases, and to vary, and perhaps improve, the technique of treatment from time to time.

Methods of General Treatment

The general treatment is very important, and I propose to deal with this first.

The fatal effects of tetanus are principally due to: (1) poisoning of the vital centres, causing respiratory and cardiac failure ; (2) exhaustion due to continuous muscular spasm and repeated seizures on the top of it, the latter being intensely aggravated by peripheral stimuli, even very light ones. To minimize this second factor requires very careful, painstaking, and intelligent nursing.

A well-ventilated dark room is very important, as by this means the external stimuli are considerably reduced. In the construction of small tetanus wards the walls should be painted dark, window shutters obliquely placed, and an exhaust fan provided. There should be silence in the ward. The slightest noises, such as caused by shuffling of the feet or jingling of glass, bring on spasms. Bromides, chloretone, chloral hydrate, hyoscyamus, etc., are the usual sedatives employed. Large doses are required at the beginning. Morphine with atropine may be useful when the spasms are very severe, and during the early stages. Too much morphine, however, should be avoided, especially when pulmonary complications are present. The prolonged use of these sedatives is attended with some danger, and one has come across several cases of drowsiness and even coma after the spasms have passed away—probably as a cumulative effect of the sedatives.

CHLOROFORM AND SPECIAL DRUGS

Although all the textbooks prescribe it, and in some French journals a few cases have been reported in which enormous doses have been used with apparently good results, I do not advocate the use of chloroform for the relief of spasms. Our own experience of chloroform, which was used in earlier cases, is not satisfactory, as pulmonary oedema supervened in a fair number of these cases with fatal results. It is, of course, difficult to prove that chloroform was the factor concerned, but such is the clinical impression. We now avoid chloroform even while performing cistern or lumbar puncture. Anaesthesia, which may be required in some cases for the extreme rigidity and frequent spasms, can easily be obtained by the use of liq. somniferus (Stella and Co.). This is quite safe and gives immediate unconsciousness which acts for a short time only. It has been used in about a dozen instances in this series, and no ill effects have been observed.

Injection of special drugs, such as carbolic acid and magnesium sulphate, has been recommended for the relief of spasms, but they have not been used in this series of cases at all. On looking up the recent literature one does not find any great claims made for them, although the older textbooks recommend them. Recently two articles have been published regarding the carbolic acid treatment (Bacelli) of tetanus. Pilloni[11] has treated fifty-three cases over a period of twelve years, with 70 per cent. cures, by injection of phenol 0.5 gram for the first two days, followed by smaller doses. He had only three cases of nephritis in the series. Suvansu[12] has treated fourteen consecutive cases of tetanus with intrathecal injections of carbolic acid, with four deaths, and has not

* Being the Lord Reay Lectures delivered at the Grant Medical College in November, 1931.

included two moribund cases in the series. The dosage has been 30 to 40 c.cm. of 1 in 400 carbolic acid solution in adults, and 12 to 20 c.cm. in children. Small doses of serum had been administered in some of these cases, although not intrathecally. This, like Pilloni's, is a very small series of cases.

THE WOUND, DIET, ETC.

Local treatment is important. A dirty, lacerated wound, likely to be contaminated with other bacteria, offers a favourable spot for the growth of the tetanus bacilli, which seem to grow better in symbiosis with aerobes. The pus cocci in a tetanus wound present phagocytosis of tetanus bacilli, and these latter multiply and produce more toxin. Excision of the wound area is a better method than treating it with antiseptics. If it is not possible to excise, a thorough cauterization is essential. Experiments in guinea-pigs tend to show that the subcutaneous injections of oxygen deep into the wound may delay or prevent the onset of tetanus.[2] Presence of oxygen in the wound would certainly prevent the multiplication of the organisms, and its use in deep wounds therefore is certainly rational, both as a prophylactic and as a curative in the early stages. It has not been used in this series of cases, as the vast majority of them were well advanced.

As regards the excretory functions, retention of urine is rare, so that a catheter seldom has to be passed. Constipation, however, is the rule, and a simple daily enema is required to empty the bowels.

With the ordinary lockjaw only fluid diet is possible, while sometimes with complete lockjaw and oesophageal spasm even that is out of the question for a time. Fluids, such as milk, weak tea, barley water, etc., are given at two-hourly intervals and in small quantities, and, as a rule, they are taken without great difficulty. Nasal feeding may have to be considered, but the passage of a catheter through the nose has, in one of our cases, brought on a fatal spasm, so that one is chary of ordering this measure. Rectal saline alone may have to be relied on for nourishment for twenty-four or forty-eight hours at the most.

A marked increase in the pulse rate and the onset of respiratory failure with pulmonary oedema sometimes yield to the timely use of digitaline and atropine subcutaneously. These should be injected early and in fairly large doses—1/100 grain of the former and 1/50 grain of the latter every three hours.

Before the introduction of tetanus antitoxin the main line of treatment was the use of sedatives in large doses with injections of magnesium sulphate or carbolic acid. The results of this line of treatment have never been satisfactory if a large series of consecutive cases is considered. The mortality rate in a large series has always been above 60 per cent.

Use of Tetanus Antitoxin

As the results of the treatment adopted before the introduction of the antitoxin were very poor, it was hoped that the use of the antitoxin would revolutionize the treatment of tetanus, as happened in the case of diphtheria. Unfortunately this has not been so, and some authorities go so far as to deny that the antitoxin is of any value. It is useful, therefore, to consider first if the use of the antitoxin is rational.

EXPERIMENTAL WORK

The specificity of the antitoxin was first experimentally proved by Kitasato, discoverer of the tetanus bacillus, while working under Koch.

The experiments conducted by Sir Charles Sherrington at the Lister Institute prove the specific value of the antitoxin beyond any doubt, and also give evidence of the enormous superiority of the intrathecal route of administration. The toxin was administered to monkeys, and after some time antitoxin was given, with the following results: twelve monkeys received intramuscular injections—all died; eighteen monkeys received intrathecal injections—only five died. All the intrathecal injections were given through the atlanto-occipital membrane. (Both toxin and antitoxin were prepared at the Lister Institute.)

Sir David Bruce[3] also notes these experiments, and considers the great value of the intrathecal administration of the antitoxin. Abercrombie[4] finds that antitoxin is of decided value, the symptoms diminishing after its use, increasing after stoppage, and again diminishing when antitoxin is resumed. Such has been our experience also in a fair percentage of the cases. Stoppage of the antitoxin before all the symptoms had passed off was followed by exacerbations, which could immediately be brought under control by the administration of more serum. Ransom,[5] in an extensive and well-reasoned review of tetanus, says that the therapeutic use of the antitoxin is fully justified, as all unbound toxin is neutralized, and therefore antitoxin at the right time may make all the difference in the outlook of a case.

With all the evidence and the opinions before us, there appears to be no doubt that the use of the antitoxin is quite rational and fully justified.

It is next necessary to consider why, in spite of the use of the antitoxin in large doses, the therapeutic results are not comparable with those obtained in diphtheria. Experimentally it has been proved that the antitoxin cannot combine with the toxin that has already reached the nerve cells. "The antitoxin cannot dislodge the toxin already combined with the nerve cell."[6] Ransom[5] states that the toxin in nerves and nerve cells is inaccessible to the antitoxin; the only toxin that can be neutralized is in the blood and lymph. This explains why antitoxin fails in a large proportion of cases—advanced ones with short incubation period—where the damage has already been done and the nerve cells are poisoned. It also means that the only hope of getting better results lies in early saturation of the blood with the antitoxin and the immediate neutralization of all toxin that lies free in the cerebro-spinal fluid.

ADMINISTRATION AND RESULTS

Antitoxin can be administered subcutaneously, intramuscularly, intravenously, and intrathecally—the last by a lumbar or cisterna magna puncture.

The best route has not yet been decided, and opinions differ regarding the relative value of the different routes. We have already seen that the experimental evidence on animals is strongly in favour of the intrathecal route. Sir William Leishman and Major Smallman,[7] however, are not satisfied regarding the method of its administration, and although strongly advocating the use of the antitoxin, they say that the method of its administration leaves much to be desired. Ransom[5] states that no toxin can be detected in the cerebro-spinal fluid experimentally, even after massive doses of the toxin; although later he says, "antitoxin injected into the subarachnoid space would neutralize any toxin that might be there."

Permin[8] showed that if tetanus toxin was injected in the muscles in a suitable dose, local tetanus was prevented if antitoxin was given intrathecally at the same time, but was not prevented when the same was given intravenously. Golla[9] also claims experimental superiority of the intrathecal and intravenous routes over the others. The memorandum on tetanus by the War Office Committee[1] concludes that the intrathecal injections are the most effective.

Before I pass on to the consideration of the results obtained in this series of cases, it is necessary to say that no conclusions can be drawn from isolated cases or small groups of cases. We read in the medical literature

of case reports, mostly of single cases, or short groups of six or ten, treated by certain methods, and later these methods are enthusiastically advocated. As in pneumonia, where fluctuations in the severity of the infection and in the mortality rates are notorious, so with tetanus—a series of cases may recover, although apparently serious, and with the same treatment another series of consecutive cases may die. Hence only figures from collections of large numbers of cases, spread out over a considerable number of years, are of value.

Two facts emerge, therefore, from the foregoing evidence.

1. Early neutralization of all circulating toxin by injections of large doses of the antitoxin, and the keeping up of the concentration of antitoxin by further and repeated intravenous and intramuscular injections, are necessary.

2. Intrathecal administration is justified, and is more useful than the other routes in the experimental infections.

N.B.—In most of the experimental work cited above the antitoxin was administered through the atlanto-occipital membrane.

Review of Cases

In all I propose to review 278 cases. Of these I have taken 49 consecutive male cases admitted into the hospital in 1926 (before I took charge of the ward), which were being treated in a uniform manner (Group A). The records before these are not available. The other 229 cases have all been under my care. They are consecutive cases, and no selection whatever has been made. Fourteen of these had received no serum for some reason or another—a few were moribund, two very mild cases recovered, the rest died. The remainder are further subdivided into two main groups for purposes of comparison. Group B, 102 cases, was treated by varying doses of serum, the majority by intravenous and intramuscular routes, while twenty-two of them had intrathecal administration through a lumbar puncture in addition. The final 112 cases (Group C), in addition to having the intramuscular and intravenous routes used, were all treated by intrathecal administration through the atlanto-occipital membrane into the cisterna magna.

GROUP A

The treatment followed to some extent as a routine before I took charge was somewhat as follows: bromides and chloral hydrate by mouth in moderate doses, a fair amount of morphine, and antitoxin in doses of about 20,000 units per day, intravenously and intramuscularly. Three cases had received 18,000 units intrathecally by the lumbar route.

Three patients were below the age of 10, and five above the age of 40. In twenty-six cases (53 per cent.) the incubation period could not be determined, in ten (20 per cent.) it was eleven days or more, in three (7 per cent.) between six and ten days, and in ten (20 per cent.) between one and five days. There was no evidence or history of injury in twenty-four cases (49 per cent.), there were frankly septic wounds in twenty-two (45 per cent.), and nail injuries in three cases 6 per cent.). Treatment was similar in all cases with the exception of three, where serum had, in addition, been administered intrathecally by the lumbar route. Out of these forty-nine cases, eleven recovered and thirty-eight died, a mortality rate of 77.5 per cent. All the three in whom intrathecal administration had been made expired. Out of the thirty-eight fatal cases, seventeen died within twenty-four hours of admission. After excluding these from consideration, eleven out of thirty-two cases were cured and twenty-one expired—*a mortality rate of 65.6 per cent.*

GROUP B

When I took charge I started on the same lines, using somewhat larger doses of the serum and sedatives, and not much morphine, which in bad cases seemed to increase the tendency to pulmonary oedema, in spite of its being given with atropine. The average dose of the antitoxin was 30,000 to 40,000 units on the first day. The first eighty cases were treated in this way, with the result that twenty-eight of them recovered and fifty-two died (65 per cent.).

This was hardly satisfactory, and hence I thought of making additional use of the intrathecal route, by lumbar puncture, and further increasing the dose of the antitoxin. Twenty-two cases were thus treated, of whom eight (36 per cent.) recovered and fourteen (64 per cent.) died. The result, therefore, did not appear to be any more satisfactory than that in Group A. I admit, however, that this was a small number of cases, hence too much value cannot be attached to the figures. Clinically, in spite of two or three lumbar punctures and repeated administration of the antitoxin, the general effect was not much better, so that it was probable that the antitoxin did not diffuse high enough or quickly enough.

Taking both groups together we have 102 cases, with thirty-seven recoveries and sixty-five deaths—a mortality of over 64 per cent. In this group of cases the incubation period could not be determined in 45 per cent., was between one and five days in 19 per cent., between six and ten days in 20 per cent., and eleven days or above in 16 per cent. The percentages are quite comparable with the previous group of cases. There was no evidence of injury in 23 per cent., there were septic wounds in 62 per cent., and nail injuries in 15 per cent. In the previous group the percentage of septic and nail injuries was smaller. Thirty patients died within twenty-four hours; excluding these we have thirty-five deaths out of seventy-two cases—*a mortality rate of 50 per cent.*

TECHNIQUE OF CISTERNAL PUNCTURE

All experimental evidence was in favour of the utility of the intrathecal route for administration of the antitoxin, but still the results obtained by the lumbar route were hardly encouraging. As in all experimental work the injection was made through the atlanto-occipital membrane, one thought that the administration of the antitoxin in the cisterna magna through the atlanto-occipital space might prove more successful. Theoretically at least, the antitoxin would have a better chance of neutralizing the toxin that might be present near the vital centres. The technique of the cistern puncture is simple if ordinary precautions are taken. In over 140 punctures we have had no fatalities that could be directly attributed to the puncture. We have on six occasions not been able to get into the cisterna magna, owing either to its depth exceeding 6 cm., or to the presence of a bony spur between the atlas and the occiput.

The cisterna magna is situated in front of the occipito-atlantoid ligament at a distance of 4.5 to 6 cm. in the adult. Very rarely the distance may be greater, but for the sake of safety it is not advisable to go beyond 6 cm. The hair at the back of the head is shaved. The tips of the mastoid processes are important landmarks. The centre of the line joining the tips of the mastoid processes is the point for puncture. It would be preferable to have the patient sitting up with the head flexed, but as this position is not possible in tetanus cases the patient is made to lie on one side with the head flexed as much as possible, this position being maintained by the assistants. Instantaneous anaesthesia may be obtained by the use of liq. somniferus. After flexing the head on the chest, tincture of iodine is applied, and if no anaesthetic has been given a little 1 per cent. novocain is infiltrated in the line of the puncture for 3 or 4 cm. Even this has not been necessary in a large number of our cases. The lumbar puncture needle, which should preferably have a guard at 6 cm., or a good mark at that distance, is then introduced in the centre of the line joining the tips of the mastoid processes and above the spine of the atlas, which is easily felt. The needle is pushed in slightly upwards till the edge of the foramen magnum is struck. The point of the needle is now slightly depressed and the atlanto-occipital ligament pierced. When the needle reaches the dura mater, and while it is piercing it, the patient feels a sharp twinge of pain. The needle should now be gently rotated, and the cerebro-spinal fluid then rushes out. It is wise to remove the trocar from time to time to see if the cistern is reached. The whole operation is done slowly and deliberately. As a rule the puncture is easy, and dry taps do not occur, as they sometimes do in lumbar puncture. Twenty to thirty c.cm. of the fluid is allowed to come out, and is then replaced by a slightly smaller amount of the antitoxin. This must be done very slowly, at least two to three minutes being taken. A syringe may be used, special care being taken not to force the piston too quickly. It is preferable, however, to use the

gravity method, the barrel of a 20-c.cm. syringe being connected by a small rubber tube to a metal piece which fits the needle, and the serum allowed to flow slowly in. This being done, the foot of the bed may be raised so as to keep the fluid at a high level for as long a time as possible. The neutralization of any free toxin that might be present in the cerebro-spinal fluid will be prompt.

GROUP C

One hundred and twelve cases have been treated thus, antitoxin having been administered intrathecally in the cisterna magna, as well as intravenously, intramuscularly, and subcutaneously—often around the wound, if one is present. The cases have been mostly consecutive, all the very severe ones being included. Out of these 112 cases, fifty-nine have recovered (53 per cent.), and fifty-three have died (46.5 per cent.). Considering the mortality of Group B (102 cases), which was 64 per cent., and of Group A (49 cases), which was 77 per cent. (before excluding cases in which death occurred within twenty-four hours), this last group of 112 cases shows an appreciable difference—15.5 per cent. as compared with Group B, and 30.5 per cent. as compared with Group A.

Though not spectacular, these figures are encouraging, and justify the intracisternal administration of the antitoxin.

In this group of 112 cases the incubation period could not be determined in forty-seven cases (42 per cent.), was between one and five days in twenty-four cases (21 per cent.), between six and ten days in twenty-five cases (22 per cent.), and eleven days and above in sixteen cases (15 per cent.). These figures are quite comparable with both the previous groups. There was no evidence of injury in 24 per cent., septic injuries in 66 per cent., and nail injuries in 10 per cent. The age of the vast majority of cases (74 per cent.) was between 11 and 40, only 19 per cent. being above 40, and 7 per cent., the remainder, below 10. These figures are given as evidence that the groups of cases considered are comparable, as they are very nearly the same in age, incubation period, and type of injury. Of the fifty-three deaths in the last group, no fewer than thirty-five patients died within twenty-four hours, so that, excluding these cases, we have a total of seventy-seven cases out of which eighteen have died—*a mortality rate of 23.4 per cent.* This compares very favourably with the figures of 65.6 per cent. in Group A (small doses of antitoxin) and 50 per cent. in Group B (larger doses of antitoxin, but without administration into the cisterna magna).

DISCUSSION

Without making any undue claims for these figures, and while admitting that the number of cases is not as large as one would wish, it appears that administration of antitoxin in the cisterna magna, in association with large doses intravenously, intramuscularly, and subcutaneously, is definitely indicated in all cases of tetanus, and, provided the patient has not been admitted in such a bad condition as to die within twenty-four hours, there is a 77 per cent. chance of his recovery. This is not so if small doses of serum only are administered, or even if larger doses are given without the intrathecal administration.

As a rule one puncture has sufficed in these cases, and in only half a dozen cases has more than one puncture been made. Clinically, in the majority of cases some improvement follows within twenty-four hours of the cistern puncture. The antitoxin appears to neutralize any toxin that may happen to be free in the cerebro-spinal fluid at the time of the injection. The patient is more comfortable, takes feeds more easily, and the lockjaw seems to improve more quickly. A certain amount of reaction is usual after the intrathecal administration, the most constant feature being a rise of temperature of about 2 to 3 degrees, and perhaps a slight increase in irritability. This usually subsides within twenty-four to forty-eight hours, and does not seem to do any harm. Serum reactions do occur, although no case of a severe anaphylactic reaction was seen in our series. The usual reactions have been erythematous rashes, joint pains with or without effusion, pyrexia, headache, etc. These have all yielded to adequate doses of calcium by mouth, although in a small number of cases intravenous injections of calcium chloride had to be given. Calcium was administered as a routine in all cases from the start as a preventive for serum reactions. The small number of cases in which the reaction developed is probably due to this.

The amount of antitoxin required varies considerably in each individual case, and no hard-and-fast rule can be laid down for it. Patients have recovered with 40,000 units, while others have required over 400,000 units. Each case has to be considered on its own merits, as procedure obviously depends on the severity of the primary infection, the incubation period, the site of injury, the vitality of the patient, and other factors. The administration should be kept up as long as there are spasms and general rigidity: this varies enormously in different cases. One often meets with cases where early diminution or stoppage of the serum has brought on fresh spasms or increased the rigidity, which has promptly subsided on the administration of more serum. Very large doses of the serum have been advocated on the Continent, in America, and elsewhere. Paterson[10] of Australia advocates much larger doses—over 700,000 units per case—and claims better results. He reports only seven deaths in twenty-six consecutive cases.

As the value of convalescent serum has been established in some infective conditions, it may be profitable to try its use in tetanus. Serum might be collected from convalescent cases and preserved for use in the place of the usual antitoxin, though certain difficulties have first to be overcome. I feel that here we have an important problem. But though there is adequate clinical material the research facilities are somewhat defective.

Conclusions

It thus appears to be established that:

1. The use of tetanus antitoxin in the treatment of tetanus is perfectly rational, is absolutely necessary, and should be used early and in large doses.

2. The combined intrathecal (cistern puncture), intravenous, and intramuscular method of administration is superior to all the others. It definitely lowers the mortality rate, and ameliorates the symptoms far more than does treatment by intravenous and intramuscular routes alone.

3. The administration of the antitoxin into the cisterna magna is preferable to the lumbar puncture, as the former is nearer the vital centres. This method appears to neutralize any toxin that might be there quickly, and is much easier to perform.

4. The cistern puncture, properly performed, has no dangers. Not one single fatality could be attributed to the administration of the antitoxin by that route directly in a series of 112 cases. If the needle is not pushed beyond 5.5 to 6 cm. in adults there is no danger of puncturing the medulla.

I cannot close this paper without thanking my successive house-physicians, without whose whole-hearted co-operation the treatment could not have been carried out so consistently and successfully. All of them had the opportunity of performing the cistern puncture. My thanks are due to the superintendent of the J. J. Hospital, Lieut.-Colonel S. S. Vazifdar, for putting at my disposal the large quantities of the serum required, even though the bill at the end of the month was sometimes staggering.

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[2] Howitt and Jones: *Lancet*, 1915, i, 753.
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[4] Abercrombie: *British Medical Journal*, 1916, i, 339.
[5] Ransom: *Lancet*, 1917, ii, 928.
[6] Ibid., 1917, i, 691.
[7] Leishman, Sir William, and Smallman, Major: Ibid., 1917, i, 131.
[8] Permin: Ibid., 1917, i, 682.
[9] Golla: Ibid., 1917, i, 686.
[10] Paterson: *Med. Journ. of Australia*, 1930, i, 832.
[11] Pilloni: *Policlinico-Rome*, April 13th, 1931, p. 510.
[12] Suvansu: *Lancet*, 1931, i, 1075.

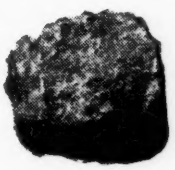
Memoranda

MEDICAL, SURGICAL, OBSTETRICAL

FATE OF A PIECE OF SHRAPNEL

Though cases of war wounds giving trouble are still common, I think the following might be of sufficient interest for publication.

In September, 1916, Mr. X was wounded on the Somme in the right thigh, just below the hip-joint. He went down the line and was in hospital at Étaples for a short time. He was in the line again on November 5th of the same year, his leg giving him no further trouble, and was discharged in 1920. At the beginning of 1930 he thought he had strained a tendon in his leg while carrying a heavy weight, and shortly afterwards he noticed a lump just



above the popliteal space. This gradually got bigger, slightly inflamed, and more painful, until in February, 1932, it burst and pus was discharged. The wound continued to discharge until the beginning of April this year, when he described it as having "crusted up." Recently he came to my surgery with a large piece of shrapnel which he had found in his bed the same morning. On examination the scar of the old wound was seen just below the hip-joint and an open wound about the size of half a crown above the popliteal space. The latter was hard, and on palpation fibrous tissue could be felt all round and clear fluid could be expressed on pressure. I put on a dressing and there seems no doubt that the wound will heal now that the foreign body has been discharged.

The photograph shows the piece of shrapnel, and the drawing the wounds of entry and exit.

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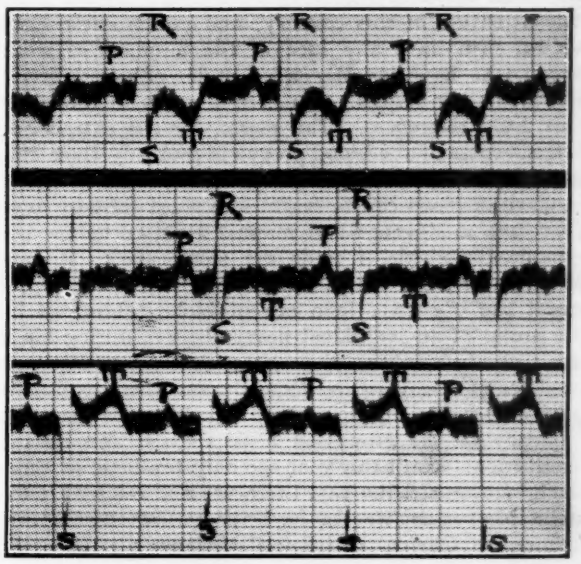
DENTAL SEPSIS AND CARDIAC PAIN

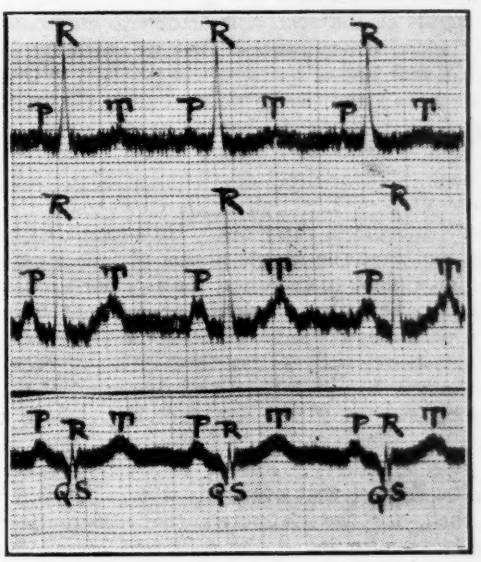
Though the dental sepsis was so gross that there was no need to call in the help of radiography, this case forms a striking example of the danger of the pulpless and painless tooth.[1]

The patient, a schoolmaster of 52, was seen on October 12th, 1930. He was fat, flabby, and in thoroughly bad general condition, and since Christmas of 1929 had become progressively dyspnoeic. For one month he had been subject to attacks of retrosternal pain on exertion with radiation down the left arm. This pain had become more and more easily induced, at first occurring only when he was walking uphill, then when walking out of doors on the level, and latterly even when walking about in the house.

Clinically, as so often happens in these cases, there was little in the way of physical signs—merely some enlargement of the heart to the left. Blood pressure had all along been within normal limits and there was no albuminuria. Symptomatically, however, his case was complete, a severe and progressive example of the effort-syndrome. Abundant objective evidence of disease was afforded by the electrocardiogram. T was sharply and deeply inverted in Lead I with concomitant less deep inversion in Lead II; there was a low take-off in Lead I with contralateral high take-off in Lead III, Lead I showing the typical "dome" of the coronary T of Pardee. Although he had had no individual and prolonged attack of retrosternal pain characteristic of coronary thrombosis and had kept about until ordered to bed by his doctor, the



patient's electrocardiogram suggested that the picture of a T1 type of coronary thrombosis had been brought about by the massed effect of repeated minute infarctions. The outlook appeared thoroughly bad, but as all his remaining teeth were carious or dead their removal was decided upon. They were extracted under local anaesthesia, one at a time, while



he was kept in bed, on a high protein diet, with three tablets of calcium-diuretin daily.

I saw him again on June 18th, 1931. He had lost three stone in weight and was wearing temporary dentures. His pain had nearly gone, but he still had reminders of it out of doors if he walked quickly, or in bad weather. Inside the house he could move with perfect comfort, and had no pain on walking upstairs. His apex had moved in half an inch and was now in the fourth space, in the vertical nipple line, four inches from the midsternal line. The electrocardiogram showed a striking change, having now become physiological, the only abnormality being a small bizarre QRS in Lead III of no pathological significance. He has continued to do well and has resumed his professional work.

Hove. DONALD HALL.

[1] Brailsford: *British Medical Journal*, 1928, i, 1013.

Reviews

BLOOD GROUPS AND THE INDIVIDUAL

The " rediscovery " during the war of Landsteiner's four blood groups has led to an enormous and constantly increasing mass of literature on every aspect of individual and racial blood characteristics. The subject has aroused little attention in this country, and perhaps few English medical men have any idea of the numbers of workers abroad who have investigated samples of population and published their results. A recent German handbook contains 2,979 references. The reason for the extraordinary attractiveness of the blood groups is probably their unique simplicity and certainty. The technique of grouping a specimen of blood can be learnt in a short time by anyone of average intelligence and manual ability, the apparatus is modest, and the records are stereotyped. Moreover, the characteristics which make up the blood groups are almost the one rock in a sea of biological uncertainty. The group of an individual never changes during his lifetime ; children inherit their characters according to the simple rules discovered by Mendel ; and there really seems to be a vague but quite definite link between the relative frequency of the groups in a population and its racial constitution. Until this year the only textbook in English which synthesized the vast literature and reduced it to an intelligible system was L. H. Snyder's *Blood-grouping in Relation to Clinical and Legal Medicine* ; Snyder is an American and the book was published in America and in London. Meanwhile, as far back as 1923, Professor LEONE LATTES had published a comprehensive work in Italian ; a German edition appeared in 1925, and a French one in 1929, in each of which Professor Lattes incorporated the latest developments up to date ; this year Oxford Medical Publications have brought out an English edition,[1] which stands as the nearest approach to an English textbook of blood differentiation that we possess. It represents Professor Lattes's view of the position at the time of going to press ; and, as he points out in the preface, the original Italian work is hardly recognizable. He had either to adhere to the original design or to rewrite the whole book, and the rapid development of the subject and the consequent modification of his views made the former plan very difficult to carry out. He anticipated ten years or more ago that the simple notion of four groups would have to give place to the quest for a genuine individuality —a blood picture that would be as different and distinct for each person as his finger prints—and this is the central idea of his book, with its full description of every means so far known to serologists and immunologists of distinguishing the blood of one individual from that of another, and—most valuable feature—its close study of every possible fallacy. Recent discoveries, however, as he admits, suggest that even this wide scope will have to be widened, for the characters that differentiate blood can be found also in all the cells and secretions of the body, and even in its excreta. Moreover, " group-specific substances can undergo profound chemical changes without any alteration in their appearance, and are subject to a very active metabolism." The trend of investigation, from being chiefly qualitative, must now be strictly quantitative. There is no doubt that the publishers have performed a great service to English-speaking medicine by giving it this essay by a man of great ability and foresight. However obscure may be the individuality of the blood, there is little doubt about that of Professor Lattes ; it glows from every page. Mr. Bertie deserves great credit for transmitting it so clearly from the French edition. It is not easy to translate medical literature, especially on a subject so wide and at times so abstruse as this.

Dr. PAUL STEFFAN'S compendium[2] forms a striking contrast to Professor Lattes's work. It is hard to believe that there exists enough knowledge about this one simple biological fact to fill such a large volume. The original proposal was, Dr. Steffan says, that he should write a book on the racial aspect of the blood groups for Messrs. Lehmann, who publish a quarterly journal (of which he is part editor) devoted entirely to this subject. Finding it, however, impracticable to treat one facet of his science by itself, he decided to enlist the help of a number of fellow members of the German Society for the Investigation of Blood Groups, and to compile a handbook which should contain every available piece of knowledge in every branch of blood grouping. The result, though perhaps it might have been expressed a little more shortly, is a most valuable book of reference, with exhaustive sections by different authors on serology, genetics, transfusion, jurisprudence, technique, and anthropology. The racial section, as might be expected, is peculiarly thorough, and condenses the results of practically every observer up to date into a large folding table, reduced by the index $J = \frac{r - p}{q}$. The reader will find the last word on the subdivisions of the A group and the distribution of the M and N characters. The medico-legal section describes the use of grouping in the German courts, where everyday reliance is placed on it. The matter is printed attractively and clearly, and the authors express their intricate ideas in incisive German.

CLINICIAN AND PATHOLOGIST

As studies at the bedside and studies in the laboratory have a common aim—namely, a diagnosis that is a complete knowledge of the individual patient—the two groups of workers concerned clearly ought to be able to understand one another. The clinician is long established and speaks a well-known tongue, while the laboratory worker is mapping out an ever-widening field and developing a new vocabulary. Very reasonably he attempts to explain his area of usefulness and to attach a clear meaning to the terms of his reports. This ambition is the motive which underlies Dr. ALBERT S. WELCH'S *Clinical Interpretation of Laboratory Reports,*[3] and Dr. ARNOLD RENSHAW'S *Laboratory Service and the General Practitioner.*[4] Neither pretends to describe the technique of the various tests now more or less generally employed, and neither fails to recognize that the last diagnostic word is with the clinician, not with the laboratory. But each attempts to indicate where clinical observation may be aided by chemical and other tests, and what is the significance of positive and negative laboratory findings. Dr. Welch cultivates particularly the clinical side in the sense that he describes not only laboratory possibilities, but also what observations are possible apart from particular tests, or with such tests as are the commonplaces of practice. On the other hand Dr. Renshaw, with much the same aim, enumerates very fully the abounding opportunities in

[1] *Individuality of the Blood in Biology and in Clinical and Forensic Medicine.* By Professor Leone Lattes. Translated by L. W. Howard Bertie, M.A., B.M., B.Ch.Oxon. London: H. Milford, Oxford University Press. 1932. (Pp. xiv + 413. 30s. net.)

[2] *Handbuch der Blutgruppenkunde.* Edited by Dr. Paul Steffan. Munich: J. F. Lehmann. 1932. (Pp. xi + 669 ; 125 figures, 3 charts. M.50.)

[3] *Clinical Interpretation of Laboratory Reports.* By Albert S. Welch, A.B., M.D. Philadelphia: P. Blakiston Son and Co., Ltd. 1932. (Pp. xv + 366 ; 16 figures, 1 plate. 4 dollars.)

[4] *Laboratory Service and the General Practitioner. An Interpretation of Pathological Aids to Diagnosis.* By Arnold Renshaw, M.D., B.S., D.P.H. London: H. Milford, Oxford University Press. 1932. (Pp. xii + 267. 10s. 6d. net.)

which the laboratory may be helpful, and he may perhaps be considered somewhat expansive in this direction. Thus what is named "a practicable scheme" for dealing with "a chronic toxaemia" includes no fewer than twenty-five different enterprises, and cannot therefore be said to be lacking in thoroughness. None the less Dr. Renshaw writes from a large experience and has a healthy enthusiasm for his task. Both books, in short, are full of helpful information, and they meet a position which has gradually developed and which, unless intelligently handled, is capable in individual instances of producing serious misunderstandings. What the clinical laboratory can do, what are its limitations, and what interpretations apply to the reports which it issues—these are the praiseworthy purposes of the works under consideration, and each volume deserves a cordial recognition. Dr. Dan McKenzie, in an introduction for Dr. Renshaw, welcomes the "level-headed pathologist" as a contrast to the perplexed "clinician," while Dr. E. O. Laughlin, in a foreword for Dr. Welch, claims that the desire of the sick man is for the personal opinion of the "physician" and not for "the verdict of a commission of specialists." Our present authors may be accepted as desirous of reconciling these two points of view.

PHYSIOLOGY OF BACTERIA

The book by Professor OTTO RAHN entitled *Physiology of Bacteria*[5] is a useful addition to bacteriological literature. Because of the urgency of the problems with which the first discoveries of bacteria were related, the science of bacteriology developed a strong bias for practical objectives, often to the neglect of disinterested theory and speculation. Bacteriological literature is still relatively deficient in works dealing with the physiology and biochemistry of bacteria, though to some extent this has been made good in recent years. Professor Rahn's book will do much to correct this deficiency in the field of theoretical bacteriology. The main questions with which it deals are the energy requirements of bacteria, the growth of bacteria, and the mechanism of their death. In those sections dealing with subjects with which the reviewer has special experience the book gives a carefully documented account of the present state of knowledge. One admirable feature is the division of each subject into sections, at the end of each of which is provided a concise summary of facts and of theories. This arrangement adds much to the value of the book for reference purposes.

PRE-OPERATIVE AND POST-OPERATIVE TREATMENT

One of the most remarkable features of modern surgery is the attention which is now paid to the care of the patient both before and after operation. The *Principles of Preoperative and Postoperative Treatment*,[6] by R. A. CUTTING, furnishes an exhaustive account of all that can be done beforehand to prepare a patient for operation and all that can be done afterwards to ensure success. The author has spread his net widely, and there can be few methods omitted from his survey, so that the novice might well be confused between the many procedures described. The book, however, is obviously not intended for the novice, but for the surgeon in full practice who wishes to use every available modern method which can be of advantage to his patient, and who is capable of selecting the most suitable for the special circumstances of his case.

An elaborate discussion of the preparation of the patient is followed by an equally full discussion of normal post-operative care. There next follow a series of articles giving the most modern views on shock, on blood transfusion, on water balance, and on acidosis. Each of these is a scientific treatise by itself, and describes in most elaborate detail both the theory and the practice of the procedures described. We then come to a discussion of all the complications which may follow an operation, sixty pages being devoted exclusively to the treatment of operative wounds. It is perhaps far-fetched to introduce articles on the immediate treatment of extensive superficial burns and the treatment of acute traumatic cranio-cerebral injuries, neither of which strikes us as being a very usual sequel of an operation, at least in this country! The articles themselves are, however, of great interest, and one would be sorry to have missed them. As we have said, the book should prove of immense value to everyone engaged in operative surgery, for although it is large and somewhat diffuse it contains a vast amount of information otherwise difficult of access. As a work of reference it should prove invaluable.

ANATOMY OF THE NERVOUS SYSTEM

The detailed anatomy of the nervous system is notoriously difficult for the student to grasp. This arises in great part from the complexity of nervous structure, which does not lend itself to piecemeal dissection, and requires imaginative reconstruction from sections in different planes. Further, difficulty is experienced in amassing a multitude of facts concerning tracts and nuclei of which practically none are verifiable by the student himself, being derived from highly specialized branches of anatomy and physiology. It is with especial pleasure, therefore, that we welcome a new edition of VILLIGER'S description of the anatomy of the nervous system. Though not in general use in dissecting rooms because its scope is rather beyond that of the ordinary student of anatomy, the previous editions have long been known to those searching for a full general account of anatomical detail of nervous structure. It combines with great advantage a most excellent general description of the nervous system, both macroscopic and microscopical, a comprehensive and clear account of the tracts and fibre bundles, and an atlas of a series of Weigert sections through the brain stem of a four-year-old child.

In the new (fourth) American edition[7] the text has been slightly enlarged to include a brief account of the newer knowledge of neuroglia and a description of tract dissection of the cerebral hemisphere, and a few new figures to illustrate these additions. The general appearance and convenient size of the book are unaltered. The discussion of aphasia might with advantage be simplified and made less diagrammatic in accordance with modern views, and the minute anatomy of the lateral spino-thalamic tract might be discussed more fully considering its importance in the operation of antero-lateral cord section for the relief of pain. These are, however, but practical applications upon which the book pretends to no complete authority, and as a textbook of brain and spinal cord anatomy of moderate size it has pride of place.

[5] *Physiology of Bacteria.* By Otto Rahn. Philadelphia: P. Blakiston Son and Co., Inc. 1932. (Pp. xiv + 438; 42 figures. 6 dollars.)

[6] *Principles of Preoperative and Postoperative Treatment.* By Reginald Alex Cutting, M.D., C.M., M.A., Ph.D. Hoeber's Surgical Monographs. New York: P. B. Hoeber, Inc. 1932. (Pp. xx + 812; 76 figures. 10 dollars.)

[7] *Brain and Spinal Cord. A Manual for the Study of the Morphology and Fibre-tracts of the Central Nervous System.* By Emil Villiger. Edited by W. H. F. Addison, B.A., M.D. Fourth revised American edition, from the eighth to tenth German edition. Philadelphia and London: J. B. Lippincott Company. 1932. (Pp. 337; 262 figures. 25s. net.)

NOTES ON BOOKS

In *Recent Work on Ptosis (Prolapse) of the Female Pelvic Viscera*,[8] Mr. E. HESKETH ROBERTS reviews most of the recent contributions to this subject, and includes an account of his own dissections, together with some thirty roentgenographs. The anatomy of the pelvic cellular tissue, the pelvic fascia, and the suspensory ligaments is considered at some length. The descriptions are not always easy to follow, and it is not always certain when the author is recording his own observations and when he is quoting other people's work. Some unfamiliar terms are used—for example, the meso-vesico-mullerian suspensory tissue, myo-fibro-mesial tissue—which do not simplify the descriptions. Further, it is not always easy to comprehend what are the conclusions reached at the end of each chapter.

Mrs. NEEDHAM has succeeded in presenting in her small book, *The Biochemistry of Muscle*,[9] a clear account of the present state of knowledge concerning the chemical events associated with muscular activity. Anyone who has tried to follow the enormous amount of work recently published on this subject will realize that she undertook a very difficult task. They will be grateful to find that a mass of literature, often contradictory, is here condensed and reduced to order. The chapters dealing with the part played by phosphorus-containing compounds are particularly valuable, and the book may be warmly recommended to students and to any others concerned with muscle chemistry.

A Textbook of Embryology[10] will give real pleasure to the reader, containing, as it does, a very accurate account of the principal facts of embryology, expressed with conciseness and lucidity, and agreeably produced. In some sections—for example, that devoted to the heart—the description is too condensed. Dr. MARY HARMAN has confined herself almost entirely to the structural and descriptive aspects of her subject. A medical student would find the text too brief in parts, would miss the point of view that indicates the special significance of embryology for his later work, and would find unnecessary the many illustrations, mostly taken from Gray's *Anatomy*, of the adult anatomy of the part whose development is being described. The explanations of these things is to be found in the preface. There the author discloses the composition of the classes for whose benefit she has written her book. They consist of students "majoring in home economics and physical education, smaller groups of premedical students, and those taking embryology as a cultural subject." Her difficulty lies in the fact that her students have little knowledge of anatomy. We wonder if it is possible to overcome the difficulty of teaching embryology in the absence of such knowledge; and in this country embryology has yet to attain the distinction of ranking as a cultural subject. Can a subject which does not deal with "values" ever be cultural? Be this as it may, we must admire the intellectual enthusiasm of students who attempt so difficult and complex a subject without hope of professional advantage.

Dr. ÉTIENNE BURNET's admirable little work on leprosy[11] belongs to the small group of medical books which can be read with profit and pleasure by the doctor and the cultivated layman. The work is divided into thirteen chapters, in which a full and enthralling account is given of the historical aspects, incidence, symptomatology, treatment of the disease, and psychology of the lepers. There is also a description of the leper hospitals of to-day, with special reference to that at Culleon in the Philippine Islands, and of the campaign against leprosy undertaken by the League of Nations and the part played by France in particular. Dr. Burnet, who is well known in the world of belles-lettres as well as in the domain of scientific medicine, possesses special qualifications for writing a work of this kind as he has recently returned from a world tour for the study of leprosy undertaken on the authority of the Health Section of the League of Nations. He has also taken an active part in the international congresses on leprosy held at Manilla and Bangkok.

The *Scottish Youth Hostels Handbook, 1932*,[12] edited by JOHN FRANCEY and ALAN FOTHERGILL, contains a useful account of tours which can be based on the numerous hostels for the young which are springing up in Scotland as elsewhere in Great Britain. Effective illustrations, practical hints, and descriptions of the countryside may assist some to plan health-giving holidays.

A mock-heroic poem by Laennec, entitled The War of the Veneti,[13] has recently been published for the first time by Dr. Busquet, the librarian of the Académie de Médecine, who had obtained the manuscript from the Musée Laennec at Nantes. The poem—which pretends to be a translation from the Celtic—consists of six cantos, of which the fifth is fragmentary, relating the successful expedition of General Brune in January, 1800, to raise the siege of Vannes by the Chouans. Laennec took part in the campaign in the humble capacity of a third-class officier de santé. A key to the poem is appended.

A short time ago we commended to our readers a little booklet published by the Eugenics Society on how to prepare a pedigree. The society has now produced a more elaborate publication, which they call a Pedigree Schedule. The intention is that in this volume a full family record may be preserved in a permanent form. As before, instructions are included as to how to fill in a pedigree, using a system that is internationally recognized—squared paper for the pedigree, a number of blank sheets for notes, and a number of individual case sheets. The volume is very sensibly arranged on the loose-leaf principle, and is most durable and attractive. The paper is guaranteed to last at least a hundred years. The society states that its object is to encourage people, for their own interest and for the interest of their descendants, to prepare an accurate family record. If kept up to date from generation to generation the schedule should fulfil, though more accurately and completely, the purpose of the traditional family Bible.

[8] *Recent Work on Ptosis (Prolapse) of the Female Pelvic Viscera.* By E. Hesketh Roberts, F.R.C.S.Ed., M.B., B.S. London: Dickson and Scudamore. 1931. (Pp. viii + 110; illustrated. 9s. 6d. net.)

[9] *The Biochemistry of Muscle.* By Dorothy Moyle Needham, M.A., Ph.D. Methuen's Monographs on Biological Subjects. (Pp. viii + 166; 14 figures. 5s. net.)

[10] *A Textbook of Embryology.* By Mary T. Harman, Ph.D. London: H. Kimpton. 1932. (Pp. xiii + 476; 284 figures. 18s. net.)

[11] *La Lèpre Legende, Histoire, Actualité.* By Dr. Étienne Burnet. Paris: Flammarion. 1932. (Pp. 185; 27 illustrations. 12 fr.)

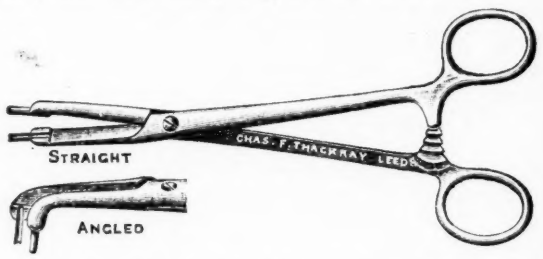
[12] *Scottish Youth Hostels Handbook, 1932.* With a foreword by the Prime Minister. Edited by John Francey and Alan Fothergill. Edinburgh: The Edinburgh Press. 1932. (Pp. 88; illustrated. 6d.)

[13] *La Guerre des Vénètes.* Poème Epique héroï-comique. Par H. J. Laennec. Publié par le Docteur Paul Busquet. Paris: Masson et Cie. 1931. (Pp. 74. 20 fr.)

PREPARATIONS AND APPLIANCES

RADIUM NEEDLE INSERTER AND PROBE

Dr. DAVID A. HERD (Liverpool) writes: At present radium needle inserting holders and radium needle probes are made as two separate instruments. This entails extra work, waste of time, and unnecessary exposure to the radiation during operation. To obviate this defect I have designed a combined radium needle inserter and probe, as shown in the accompanying figure. Both angled and straight types of instrument are now being successfully used at the Manchester and District Radium Institute. They were made for me by Mr. Charles F. Thackray, Park Street, Leeds.



British Medical Journal

SATURDAY, SEPTEMBER 24th, 1932

RONALD ROSS

The story of the work done in India by Sir Ronald Ross in the face of official indifference and active obstruction, how he overcame all obstacles and brought his quest to a triumphant issue, is known to all the world. The early part of it was told by Sir Patrick Manson in one of his Goulstonian lectures on the life history of the malaria germ, delivered before the Royal College of Physicians of London thirty-six years ago and published in the *British Medical Journal* on March 28th, 1896. When Manson, the Father of Tropical Medicine, died in 1922 Ross wrote in these columns: "Patrick Manson was a great man who, with Laveran, Golgi, and Bruce, flung wide the gates of parasitology for tropical medicine to enter." Manson did not invent the mosquito theory of malaria, but by a profound piece of induction from his own epoch-making work on filariasis he gave it shape and life, and his fruitful suggestions helped Ross to lay bare the precise relation between human malaria and mosquitos. The brilliant researches of Ronald Ross, culminating in the discovery on August 20th, 1897, of the Laveran plasmodium in the stomach tissues of female anopheles which had fed upon the blood of malarial patients,[1] have made all mankind his debtor. To Ross we owe the identification of the mosquito cycle, the mode of infection, and the species of mosquito. He laid the scientific foundation on which a truly scientific prophylaxis might be built, and himself did much to build it. His discovery spread before the world of medicine a vast field for future study and effort. Now his labours and disappointments and quarrels are over, and he goes to his rest acclaimed and honoured as a pioneer, a man of genius, and a benefactor of the human race.

NON-SPECIFIC PROTEIN THERAPY

The favourable reaction often observed in diseases of the skin when an independent and accidental febrile process supervenes is well known. In this connexion Dr. Cranston Low, in his paper on the uses of non-specific protein therapy (printed at page 577 this week), particularly adverts to the improvement in psoriasis and eczema following pneumonia, and to the amelioration in lupus vulgaris as a sequel of erysipelas. From the germ idea contained in these natural experiments a system of therapeutics has gradually developed, which, as Dr. Cranston Low tells us, has an application in many diseases, and is useful and safe, provided it is employed in its proper place.

The criticism that non-specific protein therapy is unscientific and empirical is not without some truth. We cannot, indeed, pretend to understand with any degree of certitude the nature of the reactions which bring about the curative process. This is not to say that clinical and laboratory research has been neglected. The records of many investigations are available, but they are as yet incomplete and in some measure contradictory. Taking a broad view, it would seem most profitable in the present state of our knowledge to presume that the conditions which have shown themselves to be suitable for non-specific protein therapy are allied to the sensitization phenomena. Some, indeed, are clearly of this nature. With this fixed point, even with its manifest demerits, we have at least a working basis. In a condition of sensitization of an organ or tissue it is supposed that the anti-substance is attached to the cells, which are by this means prepared to react when the specific antigen is brought into contact with them. Specific desensitization can be carried out when it is possible to identify the causal antigen—as in the case of urticaria brought about by some article of diet—by the ingenious device of administering a minute portion of the food substance one hour before the meal is taken, a method first employed by Pasteur Vallery-Radot and Lucien Rouquès. Injections by the intravenous, subcutaneous, or intracutaneous routes are also used in suitable cases for a variety of different conditions. Where the nature of the exciting agent cannot be ascertained exactly, one of the non-specific methods may be substituted, often with equally satisfactory results.

The enterprising physician, observing this response to non-specific agents, endeavours to find new and other uses for them. He recalls the application of Coley's fluid in malignant disease: if he had used salvarsan when it was introduced he will remember that the saline solution in which it was dissolved was not at first freed from air-borne organisms and their products by double distillation. Contaminated in this way, although sterile, the salt solution was in itself capable of inducing a sharp febrile reaction. He may reflect upon the superior achievements of the early salvarsan treatment and wonder how much this complementary action affected the result. Whether non-specific treatment of skin and venereal diseases has developed in this natural manner, or has been the outcome of applied laboratory investigation, is at the moment of no great importance. The fact is that there are available a varied selection of non-specific remedies which may be used, and which we have learnt to use, with advantage in a great many and very different conditions. Some of these aim at inducing fever—for example, T.A.B. vaccine given, as a rule, by the intravenous route; or artificial malaria in the treatment of general paralysis. Others, such as whole-blood injections, do not invoke or require a febrile response. But the list of remedies does not end with the protein substances. Crystalloids, as well as

[1] Ross: *British Medical Journal*, December 18th, 1897, p. 1786.

colloids, to use a convenient terminology, have been pressed into the service of this new therapeutic device. This may appear outside the range of protein therapy. It is known, however, that a large number of drugs are able to induce a hypersensitization, and in this respect seem to behave as antigens producing anaphylactic antibodies—probably by combining with proteins.[1] Whatever the explanation may be it is a fact that crystalloids such as calcium chloride, sodium carbonate, etc., have been used with success as desensitizing agents in, for example, urticaria. Ravaut has similarly employed thiosulphate of soda since 1920, claiming excellent results from it, both when administered by the mouth and when given intravenously, in a group of conditions of the skin which are, or appear to be, of the nature of sensitization phenomena.

One interesting fact is on record which may throw indirectly some light on the nature of the non-specific reactions—namely, that after enteric fever, when the specific agglutinin has largely disappeared, a febrile attack, or infection with another organism, will induce its reappearance in the blood. A reaction of this kind can obviously only occur in special circumstances. But that it does occur is evidence of the resources of the body, held in reserve, ready to be mobilized upon demand, resources which can sometimes be demonstrated by a simple biological reaction—as in the Widal test—where the chemist can find nothing. To restore the balance in certain conditions by methods the application of which we are beginning to understand is the object of non-specific therapy. Achievement has often proved illusive. "I," said Glendower, "can call spirits from the vasty deep"; to which Hotspur replies: "Why, so can I, or so can any man; but will they come, when you do call for them?"

PENAL DETENTION

Among the important subjects dealt with in the Prison Commissioners' Report for 1930[2] is the question of detention in Borstal institutions. The figures show an increase. In 1929, 679 youths were sentenced to Borstal detention; in 1930, 725; and in 1931, 877. The Camp Hill Prison in the Isle of Wight has now been appropriated as an additional Borstal institution, whilst the new institution at Lowdham, near Nottingham, is nearing completion. The work is being done by Borstal boys themselves, with expert assistance, the scheme for employing selected boys having proved very successful. There have been very few attempts to run away, and an excellent spirit has prevailed throughout the whole institution. There are now five Borstal institutions for boys, and the increase in the number has made it possible to set aside different institutions for different types of youths. At one end of the scale are received boys who have had most experience of evil courses; at the other is an institution which takes only those who are in the initial stage of criminality. The risk of contamination can thus be reduced to a minimum, and different methods of training can be adopted for various types of offenders. The Commissioners regard no case as "too bad for Borstal." A Borstal sentence is thought to be more deterrent than a prison sentence because it is longer, and it is in the length of a sentence that deterrence mainly lies. Moreover, life in such an institution is more strenuous than in a prison, and the methods of training make a greater demand on individual effort and self-discipline.

Cases which might be thought to be "too good for Borstal" raise a more difficult problem. Should they be sentenced to imprisonment instead? The question of whether a particular offender is liable from criminal habits or tendencies to a Borstal sentence is one for the court to decide. Often at a first conviction there is evidence that the offender has been developing lawless habits and is in need of a substantial period of training "by reason of criminal tendencies." If in such a case a Borstal sentence is passed, the offender goes to one of the institutions set apart for youths who have not yet developed strongly marked criminal habits. As regards "aid on discharge," the Borstal Association reports that, during 1930, 783 youths were discharged to its care on licence from the institutions. Of these 574 were discharged for the first time and 209 after a further period of training. During the year an attempt has been made to assess the value of certain methods (those of the National Institute of Industrial Psychology) in diagnosing the occupational potentialities of Borstal lads. Two years will be required before these tests are concluded, but preliminary trials have been promising. The results may be of value in showing whether the present occupations in Borstal institutions are satisfactory.

That the health of our prison population is good seems evident from the report of the Medical Commissioner, Dr. Norwood East. The new dietary, which was introduced in certain prisons in 1928, has been shown by experience to be an improvement on the previous diet. The cycle of dinners is altered from month to month, and the prisoner is thus unaware beforehand what food he will have on any day. The prohibition of tobacco has been observed in one prison to cause a remarkable improvement in men who "on reception" are suffering from chronic bronchitis. During the year 2,528 prisoners were remanded for mental observation. In this connexion the medical commissioner offers some criticism of the summary courts of jurisdiction. Magistrates should call for medical evidence before disposing of the case rather than demand observation of the mental condition of an offender during sentence. Their attention is further drawn to the advantages of voluntary mental treatment in non-certifiable probation cases as a possible means of checking a certain number of criminal careers. The value of voluntary treatment in a mental hospital is also stressed in cases of attempted suicide.

[1] Wells: *Chemical Pathology*, fifth edition, 1925.

[2] Report of the Commissioners of Prisons and the Directors of Convict Prisons for the Year 1930. London: H.M. Stationery Office. 1932. Cmd. 4151. (1s. 6d. net.)

EFFECTS OF ATROPINE AND BELLADONNA ON DIGESTION

The action of belladonna and atropine in reducing spasm and diminishing secretion of digestive juices is so generally acknowledged that use of them in clinical medicine is common. In a recent review[1] Savy and Delore of Lyon point out, however, that the clinical results obtained are far inferior to those which should theoretically be expected. They have therefore attempted to collect the clinical and experimental data available and draw conclusions applicable to treatment. In experiments in pharmacodynamic action on the digestive functions atropine has been used more often, but the results obtained apply equally to belladonna. Both drugs paralyse the peripheral terminals of the vagus at the myoneural and adenoneural junctions. As Claude Bernard said, belladonna is the curare of the non-striated muscles. Thus all the digestive organs which contain unstriated muscle are susceptible to the action of atropine, and at the same time most of the digestive secretions are diminished. Since the action of the vagus is to excite motility and secretion, exaggerating the contractions of the stomach musculature and augmenting the gastric secretion, it is natural that for the majority of authors atropine and belladonna should represent the ideal remedies in all vagotonic digestive disturbances. That the results of clinical trials are often disappointing is due, according to Savy and Delore, to certain factors being lost sight of. As regards dosage, for instance, large doses are needed to bring about the peripheral paralysing effect, since small doses only produce a central stimulation of the vagus, thus causing an effect entirely opposite to that which is sought. Similarly, the relaxing effect can only be obtained when the muscle is in a state of excitation and contraction. This has been shown in the discordant reports of numerous authors who have experimented with the action of atropine on the movements of the stomach. One can only expect an antispasmodic effect with relatively large doses, and the action is much more efficacious when the spasms are intense. As regards secretion, the hydrochloric acid may be diminished but cannot be entirely stopped by means of doses within therapeutic limits. Indeed, Savy and Delore believe that bromides and the alkaline earths have more constant and more manifest results than belladonna in cases of gastritis associated with hyperchlorhydria. They believe that in cases of pylorospasm especially belladonna has a very real use. They use it as the tincture, giving ten drops three times a day and increasing daily by six drops until sixty drops are taken, then reducing again and repeating the series three or four times successively. An alternative is a pill containing one-sixth of a grain each of extract of belladonna and powdered belladonna. They hold that positive results can only be expected in most cases with a dosage greater than that usually employed, enough to produce dryness of the mouth. Patients should be warned, too, that they may expect some interference with vision. The authors find special indications for the use of belladonna in cases of aerophagy, where the combination of hypersecretion of saliva and gastric spasm is ideally met. They would agree with Boas that in other gastric complaints belladonna remains of distinctly less value than bismuth and the alkaline earths. We have little evidence of the action of belladonna on intestinal secretion, but its calming effect on intestinal motility makes its use in spastic constipation and muco-membranous colitis reasonable—it is especially valuable in conditions of more severe spasm, such as lead colic, the acid colitis of pulmonary tuberculosis, and spasms of the anus associated with fissure. The dosage must be pushed until full physiological action is obtained. The action on the gall-bladder and bile ducts is more doubtful. In biliary colic belladonna may be an adjuvant to, but is not a substitute for, morphine. In prolonged or repeated subacute attacks of biliary colic, suppositories containing one-third of a grain of extract of belladonna may be very useful. Atropine and belladonna, we may conclude, have a distinct place of usefulness in affections of the digestive tract, especially in those which are associated with excessive spasm of the muscular coats, but the dosage must be adequate or disappointment will result.

[1] *Journ. de Méd. de Lyon*, July 5th, 1932, p. 409.

PUBLIC HEALTH IN KENYA

The Tropics are rapidly losing their terrors for the European, and the decline in preventable diseases in the warm parts of the earth is an ever-growing tribute to the part played by medical science as one of the most potent factors in civilization. But there is still much work to be done, not only in preserving the health of the white immigrants, but in creating a disease-free environment for the native. Dr. James Sequeira, in the Chadwick Lecture[1] of April last, reviews the situation as it at present exists in Kenya, and describes the probable course of development in the future. The native is seldom if ever "fit" in our meaning of the word; and this lack of fitness depends not on climate or on diet, but on disease. This disease is largely preventable. There are about three million natives in Kenya, and the number is increasing under the *Pax Britannica*. The most serious disease is, of course, malaria, which infects almost every person. Very nearly as important are the various parasitic worms. Yaws is widespread, but venereal disease is only of consequence in the urban areas, although modern transport favours its spread; in any case syphilis as it affects the African is relatively mild, possibly owing to the presence of malaria. Tropical ulcer is common and serious. Surgical and bovine tuberculosis are both very rare, but the disease seems otherwise to be increasing. Infant mortality is appalling—in some reserves amounting to 400 per 1,000. This Dr. Sequeira attributes mainly to maternal ignorance and dirt. The problems of the native cannot be properly tackled without a knowledge of both psychology and anthropology. The average mentality is low, the mean being about that of a European child of 8 or 9; but the African has a very well developed faculty of imitation, and his memory is often surprising. He should be approached on health matters through his idea of self-preservation and his strong instinct of reproduction of the species. Superstition is still powerful, and he often believes that medical surveys have as their object the prevention of child-bearing.

[1] Published in the *East African Medical Journal* for June, 1932.

Modern transport, however, allows health officers quicker access to the native populations, and the spoken word has great influence. His interest is easily roused by medical exhibits at shows, and the cinema is proving an invaluable help in assisting in his education. Natives are being trained as medical assistants, but no attempt should be made to turn these native assistants into an inferior kind of doctor. Housing is a difficult problem. The average native hut is appallingly dangerous, but even here substantial improvement is being made. Diet is often poor and insufficient, though the veterinary department is doing excellent service by increasing the milk yield from native cows. One of the most far-reaching factors in the improvement of native conditions was the establishment of the Jeanes School in 1925. Its function is to train visiting teachers or guides, the teachers being men selected by the missions. They are employed in the reserves to improve the work of the village schools and to promote the general health and well-being of the people. The course lasts two years, and the teachers are accompanied by their wives and children. Refresher courses are held yearly, and the teacher never loses touch with the school. Much has been done by the Jeanes School and the missions ; much more remains to be done. This is especially true of the women and children. Their education can only be undertaken by African women. The use of European women for this purpose is impracticable ; their numbers are insufficient and the distances too great. In normal times the medical services cost about a quarter of a million yearly—money well spent—and it cannot be regretted too much that the retrenchments required by the financial crisis have temporarily stopped further progress. No country can prosper unless its people are prosperous, and Dr. Sequeira's lecture is excellent evidence of the importance of public health in bringing about prosperity.

THE PITUITARY IN PREGNANCY TOXAEMIA

Of all obstetrical problems the cause of the pregnancy toxaemias has always been the will-o'-the-wisp, and it has been almost the rule that the new hypothesis which is brought forward every few years should be discarded within a short space of time. Recently the pituitary theory, first suggested by Hofbauer, has been carefully investigated by Anselmino, Hoffmann, and Kennedy, working at the Düsseldorf Frauenklinik and the Edinburgh Department of Physiology.[1] It is based on the assumption that some of the symptoms of albuminuria of pregnancy—such as water retention, oedema, rise in blood pressure, inhibition of diuresis, and capillary spasm—can be explained by supposing excessive activity of the posterior hypophysis. The experimental work depends on the demonstration of pharmacological effects similar to those of the pituitary hormone in the serum of patients suffering from albuminuria of pregnancy. Blood is citrated, centrifugalized, acidified with acetic acid to *p*H 3.9 to 4.3, and then filtered through acetic collodion. The filtrate is kept on ice and neutralized with sodium hydroxide before use. The antidiuretic action of the extract was tested on rabbits, when it was found to compare very closely with the effect of the pituitary hormone. It was also shown that the antidiuretic effect was removed by exposure to ultra-violet radiation, by shaking the filtrate with talc, and by making the extract alkaline. A similar parallel to pituitary hormone was shown in the effect on the melanophores of the frog. The authors therefore claim that the principle in the blood of these cases which produces such effects is identical with the pituitary hormone. The clinical results showed that controls from pregnant and non-pregnant women were negative with one exception, and that in twenty-four out of twenty-five cases of albuminuria and eclampsia the antidiuretic principle was present. These results and conclusions are of great interest and importance. Any addition to our knowledge of the biochemistry of the toxaemias of pregnancy is to be welcomed, and even if the evidence brought forward that the factor in the blood of toxaemia patients is identical with the pituitary hormone is not conclusive, the presence of a substance of this nature demands the closest attention. It is generally admitted at the present time that the endocrine system is profoundly disturbed in the toxaemias of pregnancy, and indeed it is not difficult to make out a good case to show that the main disturbance lies with the posterior hypophysis. It is hard to believe, however, that the initial fault lies in the pituitary—it seems much more likely that it lies in the ovum and that the endocrine system is affected secondarily. If the pituitary hypothesis is accepted one would expect patients with eclampsia and albuminuria of pregnancy to have strong labour pains, in view of the excess of pituitary hormone in the blood, unless the oxytocic hormone is not superabundant and the excess is limited to the antidiuretic principle. This contribution deserves the greatest attention ; it is one of the most important that have been published for many years on the subject of the toxaemias, for the facts are concrete, and that cannot be said of many of the theories of the past. Whether it will withstand the customary destructive criticism is another matter. At all events the pituitary source must henceforth require careful consideration. A useful feature is the introduction of the term " nephropathy " to describe the albuminuria of pregnancy toxaemia. This terminology might conveniently have a wider use in this country in place of the almost innumerable names which are now employed. Metropathia seems to be well established, while hepatopathia for cases of icterus gravis gravidarum is becoming almost universally employed in Germany, so why not nephropathia?

[1] *Edinburgh Medical Journal*, June, 1932, xxxix, No. 6, 376.

SIR WALTER SCOTT

The Scott centenary has prompted a good deal of writing in which various aspects of the author of *Waverley* have been recalled. *The Medical History of Sir Walter Scott* was prepared by Dr. Robert Hutchison originally as a paper to the Osler Club, and has now been published in the *Edinburgh Medical Journal*.[1] Scott's own vivid and occasionally humorous descriptions of his maladies, given in his diaries and letters, together with the great work by Lockhart, make the task of the compiler easy, but it requires—what has been fully given in this instance—the interpretation of some

[1] Vol. xxxix, No. 8, 1932.

obscure or archaic references and the sympathetic literary treatment of a Scott admirer and compatriot. An outline of Scott's illnesses was given in a note in the *Journal* of September 10th (p. 526), but Dr. Hutchison goes into the matter much more fully. As he says, a study of the medical history of a great man not only throws light upon his life and work, but also upon the state of medical knowledge and practice of his time. Scott died at the beginning of his sixty-second year. Dr. Hutchison points out that he lived longer than the fathers of the novel, Smollett and Fielding, and longer than his great Victorian successors, Dickens, Thackeray, and George Eliot. But his years were fewer than those of Defoe, Samuel Richardson, Fanny Burney, Harrison Ainsworth, Bulwer Lytton, and Anthony Trollope. In fact, Scott's death was premature. One cannot help feeling that Scott, always a good trencherman, might have lived much longer and have been freer from illness had he been more temperate in diet, especially had he moderated his gargantuan breakfasts. Dr. Hutchison draws attention to the curious fact that in his fifties Scott constantly spoke of himself as aged, and he raises the interesting question whether the men of his time were really older for their years than we are, or merely felt older. "One is sometimes inclined to think that nowadays we mature later, although we live longer than they did a hundred years ago. The fruit ripens more slowly even if it hangs longer on the tree." Premature ageing with Scott may have been due to the financial calamity which overshadowed his latest years and the herculean labours he undertook to pay off Ballantyne's creditors. Dr. Hutchison cites Scott, sticking doggedly to his self-imposed tasks, undaunted in the face of death, and never unmanned by pain, as an example to our valetudinary and fear-ridden generation. Dr. A. S. MacNalty gives us in *The Great Unknown*[1] a short and attractively written Life of Scott. Those who have neither the time nor the devotion to plod through Lockhart's ten volumes will find here a very readable summary, which includes some sidelights on the great man from other sources. The title is a misnomer. It refers to the early anonymity of *Waverley*, but, thanks to a self-revealing pen and a Boswellian son-in-law, there is hardly a character in history which stands out in greater detail than the last of the ballad poets and the first of the historical novelists.

[1] Epsom: Birch and Whittington. (2s. 6d. net.)

A SOUND-FILM UNIVERSITY

An ambitious scheme is being launched by Sir Oswald Stoll and Sir James Marchant. It is claimed that "the cinema is rapidly becoming the chosen and effective medium of this century for the expression and synthesis of art and science and all suitable knowledge. Its use for entertainment purposes will continue and develop, but it is now seen to be a potent medium for the enrichment of life, for education in its many aspects and widest ranges." For these reasons it is proposed to establish "The People's Cinema University." The cost and revenue, which have been estimated on a moderate basis, show that such a venture can be made financially successful, and with two such sponsors, the one noted for his organizing capacity and the other for his enthusiasm for social advancement, this scheme may well be attended with success. It is proposed that there should be a central building in London with a large hall and a number of lecture halls or theatres equipped with the latest sound-film installations. Films will be shown by experts and lecturers in their respective departments of knowledge—in science, history, travel, industrial processes, languages, handicraft, hygiene, physical culture, and so forth. The headquarters will act as a centre for distributing films to schools, colleges, and other institutions. It will lend projection apparatus, and also provide a fleet of motor cinemas to visit outlying villages with a view to popularizing agriculture and village industries. The "great hall" will be furnished with a large dome, in which will be installed a fully equipped Zeiss "planetarium." This remarkable instrument is a complete battery of projection lanterns forming a unit construction some 16 feet in height. By its optical systems and mechanism it can project upon the white inner surface of the dome the individual motions and images of the sun, moon, planets, stars, star clusters, nebulae, and the Milky Way, just as these are seen on a clear night by the naked eye. Further, the motions of the celestial bodies are reproduced, and can be varied for any time or place. The normal or a rapid motion can be shown so that the so-called "Great Year" of 26,000 years can pass in a few minutes. Nineteen of these instruments have already been constructed, and the latest, erected at Chicago in 1930, has been visited by over a million people. The whole sound-film university scheme is ambitious, and not without its attractions. We might be inclined to cavil at the use of the term "university" for such an institution, but, after all, the meanings of words inevitably undergo expansions and new connotations with each succeeding generation. There is, however, one danger in such a scheme—namely, that the students of the new cinema university will be hearers and watchers rather than doers. True training can never be divorced from performance, and the laboratory is as least as important as the lecture hall, however up to date the latter may be.

The *Transactions* of the eighteenth annual Conference of the National Association for the Prevention of Tuberculosis have now been published. This conference was held in London from July 21st to 23rd, and a report of it appeared in our issue of July 30th (p. 218). An outstanding feature of the reported speeches is the attention paid to the important topic of prophylaxis in the case of the young adult. Much remains to be done, but the details given show that a really practical start has been made. Other subjects of special interest which are dealt with in this volume are the need for continuity of care in tuberculosis, and the way in which Koch's discovery of the tubercle bacillus has revolutionized the outlook in preventive medicine, as well as in general medicine and surgery.

Dr. John D. Comrie has been appointed to give the triennial Alexander Black Lecture before the Royal College of Physicians of Edinburgh in 1933.

THE STATE OF THE PUBLIC HEALTH

SIR GEORGE NEWMAN'S REPORT FOR 1931[1]

Sir George Newman, as becomes a public servant, emphasizes in his Annual Report—the fourteenth for which he is responsible—the need for national economy, and urges local authorities to be vigilant to ensure a public health administration which is frugal and judicious. At the same time he makes no secret of his view that this country is not extravagant in its expenditure on public health, for the expenditure yields what he calls a justifying dividend in national survival, health, and capacity. Within little more than fifty years the general death rate has gone down from 21 to 12 per thousand, and the infant death rate from 149 to 66 per thousand births. The expectation of life half a century ago was 41 years for the boy and 44 for the girl; it is now 56 and 60 years respectively. It is sometimes said that notwithstanding the decline in the death rate, sickness, impairment, and physical defect are as prevalent as ever. Of this, says Sir George Newman, there is no evidence, and such sickness as exists is less mortal than formerly. Although no exact figures for national invalidity can be given, the English people do not behave like, or appear to be, a sickly race. It has also been said that there is increasingly excessive sickness amongst the insured population, but the reply to that is that the apparent rise indicates increased claims for benefit rather than any real increase in disease. The further fallacy that although there is a saving of young life there is no substantial saving at maturer ages is met by the fact that the percentage of mortality under fifty years of age has been steadily declining (from 42.1 per cent. in 1922 to 32.8 per cent. in 1931).

What, when all is said and done, is the cost of public health? Out of exchequer grants and local rates, and after deducting any moneys received in payment for services, the local authorities of England and Wales meet an annual bill for public health amounting to fifty-seven million pounds. But thirty-one of those millions are spent on what may be called environmental sanitary services, such as housing, water supply, and sewage disposal, and only twenty-six millions on medical services proper, including the Poor Law and the school medical services, the provision of hospitals and sanatoriums for tuberculosis and infectious diseases, the organization of maternity and child welfare, and the salaries of medical officers of health and their staffs. Two further millions represent the expenditure claim on the exchequer for medical and additional benefits under the National Health Insurance scheme. The total of twenty-eight million pounds means fourteen shillings a year per head of population, or one-quarter of what the nation spends on defence. "Relatively reasonable," says Sir George Newman, and one feels that but for his official position he would express himself more strongly.

BIRTHS AND DEATHS

In discussing the birth rate, it is pointed out that the accelerated fall since 1921 has had the effect of placing the gross population of England and Wales at the moment in exactly the position which it would have occupied had the births continued to fall at the old rate and the rates of mortality prevailing just before the war had remained unimproved. Births in 1931 in England and Wales numbered 631,081, as against 648,811 in the previous year, while deaths numbered 491,630, as against 455,427. The infant mortality figure rose from 60 to 66 per thousand births. The most important decline in recent years has been in respect of bronchitis and pneumonia and of diarrhoea and enteritis as causes of infant death. Broadly speaking, it may be said that during the last decennium the nation has been saving infant lives at the high average of 40,000 a year as compared with what it saved during the relatively good decennium of 1901–10. Sir George Newman points out that if the nation saves infant life on this scale it must not be surprised that many weakly and perhaps defective children survive, tending to increase the number of the unfit. A declining birth rate and a low infant mortality rate bring a new responsibility to rear and equip these rescued lives for healthy and productive citizenship.

Taking the period of normal working life as from 15 to 65 years, the principal certified causes of death during that age-period were as follows:

	Proportion per 1,000
Diseases of heart and circulation	194
All forms of tuberculosis	155
Cancer, malignant disease	155
Bronchitis, pneumonia, and other respiratory diseases	101

Road mortality is now so serious a factor in health returns as to require a section to itself. The number of deaths caused by vehicles has steadily risen since 1911. Last year there were more than 6,000 traffic fatalities in England and Wales. Attention is drawn to the importance of the psychological factor in the aetiology of such accidents. The term "accident-proneness" has provoked some derision since it appeared in this report, but the time may not be far distant when an examination, from this aspect, of persons seeking motor-car licences will be regarded as a natural precaution. No responsible person would minimize the part played by alcohol in road accidents, but alcohol should not be allowed to exclude the consideration of psychological unfitness which enters to an unknown extent into the problem. Another exceptional group of deaths is due to suicide. If allowance is made for the ageing of the population, the suicide rate for males is actually lower than it was before the war. It has increased for women, but only for older women. Suicide is an expedient, not of romantic youth, but of disillusioned age. The suicides which take place at ages under 40 are equal only to one-third of the number of those which take place when 40 is passed. Coal gas accounts for almost one-quarter of the male, and one-third of the female, suicides. The proportion of women who find in the gas stove a means of exit is twelve times as great now as in the immediate pre-war years.

MATERNITY AND CHILD WELFARE

In 1931 the number of deaths directly due to child-bearing was 2,601, compared with 2,854 in 1930. The puerperal death rate was 4.11 per thousand live births, the lowest figure recorded since 1927. The rate for puerperal sepsis (1.66), while showing a fall as compared with the three previous years, is still well above the general level for the years 1911 to 1924. The possible increase in the number of deaths from septic abortion is pointed to as one explanation; another is infection due to carriers. The report of the Maternal Mortality Committee is discussed. The outstanding result of the committee's labours, says Sir George Newman, is to demonstrate beyond all doubt that the crucial and pressing necessity for the solution of this problem is not more elaborate administration, but sound midwifery and greater care and skill at the bedside. In some areas the figures for maternal mortality remain obstinately high, and in others they show an exemplary lowness. The disparity is so striking that it might make statisticians suspicious.

[1] *On the State of the Public Health.* Annual Report of the Chief Medical Officer of the Ministry of Health for the Year 1931. (H.M. Stationery Office. 4s. net.)

Highest Maternal Mortalities (per 1,000 births)			Lowest Maternal Mortalities (per 1,000 births)		
Administrative Counties			*Administrative Counties*		
Pembrokeshire	9.83	(65)	Northamptonshire	1.98	(46)
Anglesey	8.62	(78)	Oxfordshire	2.01	(31)
Carmarthenshire	8.39	(78)	East Sussex	2.59	(43)
Westmorland	8.32	(68)	Cambridgeshire	2.64	(46)
County Boroughs			*County Boroughs*		
Barnsley	9.67	(110)	Burton-on-Trent	1.21	(65)
Darlington	9.25	(73)	Hastings	1.26	(51)
Dewsbury	7.55	(78)	Ipswich	1.40	(59)
Rochdale	7.38	(66)	York	1.41	(60)

(We give the infant mortality in parentheses.)

What is it that the low mortality areas actually do, asks Sir George Newman, to reduce their rate? The answer is to be found in the provision of skilled personal attention and of the necessary services—namely, a competent midwife working as part of an organized and supervised service, backed by a medical practitioner skilled in ante-natal supervision and in practical midwifery, with suitable hospital accommodation for abnormal ante-natal conditions, intercurrent disease, and puerperal sepsis. To provide a thousand clinics is not enough; they must be the right sort of clinics—attractive, popular, and thoroughly efficient.

The pre-school child is the subject of an interesting appendix to the report by Dr. Bradford Hill, who has been supervising an inquiry into the health of a number of these young children in various districts. Suggestions are made for bridging the gap between the infant welfare organization and the school clinics. It is stated that in England and Wales there are 995 ante-natal centres provided by local authorities, together with 1,914 infant welfare centres; 198 ante-natal clinics and 837 infant welfare centres are also provided under voluntary bodies.

The Insurance Medical Service

Some of the statistics and comments in the section headed "National Health Insurance" appeared in the recent annual report of the Ministry of Health and were noticed in these columns at the time (*Supplement*, August 13th, p. 132). The new regulations (1930) are described as an important step in the direction of excluding the payment of unjustifiable claims for benefit. To give effect to these regulations records are kept of the results of reference to the regional medical staff of the patients of every insurance practitioner, and if, on a comparison with the performance of the practitioner's colleagues and examination of the facts of the particular cases referred, it appears that the practitioner has issued certificates without reasonable care, he is visited by a medical officer of the staff, who discusses the matter with him. It is stated that a large number of such interviews have taken place, and have been followed by improvements in the standard of certification. A similar procedure has proved effective in staying a too lavish ordering of medicines. The regional medical staff, which at present consists of four divisional medical officers, thirty-five regional medical officers, and forty-three deputies (without counting medical referees engaged on a part-time basis), had 644,332 cases referred to it in 1931—by far the highest number so far recorded, more than twice as high as in 1927 and four times as high as in 1923. Sir George Newman thinks it highly probable that increasing experience will show that additional advantages may be secured from the existence of a body of medical officers organized on a territorial basis, and that the range of duties devolving upon the regional medical staff will be still further extended. He adds some reflections on the preventive aspects of national health insurance. He thinks it apt to be forgotten that the effective treatment of the individual patient by the private medical practitioner provides a form of preventive medicine perhaps greater in influence and wider in scope than the more public means of maintaining a healthy people. "Preventive measures against disease are, in substantial degree, being both pursued and secured by the 16,000 medical men now engaged in insurance practice."

Co-ordination of Public Health Services

In discussing some aspects of the new Local Government Act, Sir George Newman points out that three immediate things have happened: the medical aspects of the old Poor Law are in process of absorption into the public health service; institutions which have grown up under the Poor Law have been emancipated into the service of the people as a whole, and finally, there has been introduced a standard of performance by which local authorities can measure the effect of their health activities—namely, in the words of Section 104 of the Act, "to achieve or maintain a reasonable standard of efficiency and progress in the discharge of their functions relating to public health services." In many districts a careful scrutiny of existing resources has already been made and marked improvement effected; in others the medical officer of health would do well to ask himself some pertinent questions. On the question of consultations between the local authority and the voluntary hospitals, Sir George Newman states that the first necessity is the creation of a body representing the latter. It is futile to complain of lack of co-operation if the voluntary hospitals have not appointed a body with whom the local authority can co-operate, and such a body cannot be created by the local authority or by the Ministry. He dismisses the apprehensions of some voluntary hospitals that the local authorities are intending to compete unfairly with them. Local authorities cannot afford to engage in wasteful competition, but they must not be blamed if they endeavour to supplement the work of the voluntary hospitals or fill gaps which the latter have been unable to fill or have not filled. He adds that while the local authorities should be prepared to relieve the voluntary hospitals of patients who come more properly under the care of the former, the hospitals of local authorities must not be regarded as "dumping grounds" on which the cases less interesting from the medical standpoint may be unloaded.

(*To be continued*)

Nova et Vetera

BRITISH HOMOEOPATHY DURING THE LAST HUNDRED YEARS*

BY

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Perhaps we can best estimate the history of homoeopathy in this country by considering some of the men who emphasized phases of its teaching, and appealed to the more independent thinkers of their day. Hahnemann, man of dreams and action, has left us a rich legacy for the activating of very different types of mind and energy, and the limits of his teachings and suggestions are by no means reached, even in our age of scientific research.

Homoeopathy in England begins with Frederick Foster Quin (1799–1879). He became M.D.Ed. at the age of 21. He was appointed physician to Napoleon in St. Helena, only to learn on embarkation that his patient had died; and later became physician to Prince Leopold, afterwards King of the Belgians—Queen Victoria's beloved "Uncle Leopold"—and later to the Duchess of Cambridge. Quin,

*Read in opening a discussion in the Section of History of Medicine at the Centenary Meeting of the British Medical Association, London, 1932.

travelling with his Prince, met with homoeopathy in Italy, and later spent a year studying with Hahnemann. He returned to England imbued with the principles of *similia similibus curantur* and its corollaries, the single, simple, stimulus to vital energy, and the minimal dose to provide that stimulus. He was a man of great wit and charm, moved in august circles, and was everywhere a welcome guest. He published little, but he introduced homoeopathy to the learned and influential minds of his day. A stickler for medical etiquette, he exercised, in later years, a restraining influence on the polemic zeal of young enthusiasts. Quin was the founder of the original London Homoeopathic Hospital in Golden Square, the cholera statistics of which (only 16.4 per cent. deaths, to the average 51.8 per cent. of the other cholera hospitals) were so startling that an attempt was actually made (vide the Parliamentary Blue Books) to suppress them, the excuse being that "they would give an unjustifiable sanction to an empirical practice, alike opposed to the maintenance of truth and the progress of science."

Meanwhile homoeopathy was being widely introduced in less exalted circles by Paul Francis Curie (1799-1854), grandfather of the radium Curie. Dr. Curie was brought from Paris in 1835 by a rich London merchant, who was anxious for the new treatment for his invalid wife, and who helped to establish Curie in successful practice, especially among the poor.

SOME EMINENT HOMOEOPATHISTS

Among the medical men attracted to homoeopathy was Robert Ellis Dudgeon of sphygmograph fame (1820–1904). Dudgeon, M.D.Ed., 1841, was one of the keenest intellects who ever tackled the problems of homoeopathy. He wrote and translated enormously, and to him we owe translations of Hahnemann's *Materia Medica Pura*, his *Organon of the Art of Healing*, and many lesser writings. He was for years joint editor of the *British Journal of Homoeopathy*. Dudgeon was one of "the three conspirators" (as he calls them)—the other two being Lord Ebury and Palmerston's stepson, afterwards Lord Mount Temple—who sat down and concocted a saving clause to "a Bill that would have practically extinguished homoeopathy in this country." The Bill, as amended, was to the effect that any examining body which attempted to impose obligations on any candidate in regard to the practice of any particular theory of medicine or surgery should be deprived of its right to grant certificates. "This act happily deprived the licensing bodies of the power to reject candidates for degrees or diplomas on account of their homoeopathic proclivities." Dudgeon was a brilliant controversialist. When the Homoeopathic League came into being in 1886, he wrote most of the league tracts, and he took great part in the celebrated Odium Medicum conflict in the *Times* in 1888. He was no blind follower of Hahnemann, whose vehemence he deplored as aggravating the conflict between the schools. He emphasized the point that, while the medical world was seeking specifics for diseases, homoeopathy sought the specific for the patient by study of the patient's symptomatology.

John James Drysdale (1817–92), M.D.Ed., 1838, belonged to that active Liverpool group of whom the *Lancet* wrote: "Now the serpent was more subtle than any of the beasts of the field, but he was not subtle enough for the Liverpool homoeopaths"—then engaged in proving snake poisons. Drysdale helped to found the *British Journal of Homoeopathy*. He deplored the necessity for a sectarian title, but the journal had to be—the medical press of that day being closed to writers on homoeopathy—and if homoeopathy was to flourish and develop, facilities must be provided for publishing new work and translations of Hahnemann's writings. The journal adopted the Quaker motto: *In certes unitas, in dubius libertas, in omnibus charitas*. Drysdale's objective was the collection of facts; deductions he left to others.

Then came Richard Hughes (1836–1902) with his "Homoeopathic Milk for Allopathic Babes" (his *Manual of Pharmacodynamics*), which appeared in 1867; a valiant attempt to bridge the gap between homoeopathy and orthodox medicine; an appeal to men qualified in the schools, on conventional lines, dealing with diseases and their pathology (as then understood). In this he departed from Hahnemann's "specific for the individual," and reverted to the ancient idea of "specifics for diseases." His work was widely read. It appealed to the newly qualified, for here was an authority with a comprehensive grasp of pathology, as they understood it! Hughes won many converts, of whom the most important was Burnett.

James Compton Burnett (1840–1901), a Scotsman of commanding presence, studied medicine in the great medical schools of Vienna. He was a brilliant dissector, and his anatomical specimens, of which he was so proud, may still be seen in the Vienna museum. He returned to take his Glasgow M.B. in 1872, and while holding a resident post became so depressed by the results of medicine, as practised, that he had serious thoughts of throwing up his profession for something more useful. But he was persuaded to study homoeopathy with the idea of refuting it, and he not only devoured Hughes's book, but put its theories to immediate clinical test. Burnett was a great clinician. He could not agree that all medicine was a blank before Hahnemann, and that all medical progress had been interred with his bones. He published a number of brilliant monographs—among them *Diseases of the Spleen with Ceanothus, etc.*, *Diseases of the Liver with Chelidonium, etc.*—showing that drugs poisonous to certain organs can be used curatively, in small doses, to stimulate those same organs.

A great feature of Burnett's work and writings was the use he made of the old, long-proved disease products for the cure of disease. It was Hahnemann who first showed the importance of these by introducing "psorinum"—a preparation of itch. In 1833 the homoeopath Constantine Hering prepared "lyssin" from the saliva of a mad dog, and to him we also owe "anthracinum" (1836) from anthrax. In 1871 another American homoeopathic doctor, Swan, prepared his "tuberculinum" from tuberculous sputum, while Burnett had a special tuberculosis preparation which he called "bacillinum"; and these two had been in use for many years before Koch loomed on the horizon. Swan gave us also those precious remedies "gonorrhinum" and "syphillinum"; he published the provings of the latter in 1880. Swan's *Morbific Products*, with many more of these disease-product remedies, was published in 1886, and Burnett wrote in 1890: "There are but few viruses known to science that I have not used as therapeutic agents." In the use of disease products for the cure of disease, homoeopathy is not only up to date, but before date.

John H. Clarke (1853–1931) succeeded Burnett as editor of the *Homoeopathic World*. An Edinburgh graduate, he was appointed physician to the London Homoeopathic Hospital, and lecturer to the then School of Homoeopathy. His approach to homoeopathy lay in its clinical aspect. The *Homoeopathic Materia Medica*, a complete register of the symptoms produced by all "proved" (or tested) drugs, was imperfect, since provings of the newer drugs were scattered throughout our literature, and not easily come by. Clarke collected, during sixteen years of monumental labour, into one *Dictionary of Materia Medica* all knowledge available of drugs. A telling writer, he revelled in controversy. His orthodox colleagues were enemies to be bludgeoned into his way of thinking. He never outlived the polemics of the 'eighties, when *Punch* depicted pictorially and in verse "The Game Globule knocking Points off the Pharmacopoeial Pet"; but many held that such frontal attacks on prejudice were bound to fail, and a new pleader arose in Charles Wheeler, who, instead of the pathological arguments of Hughes, used the more subtle appeal to biology.

Wheeler revived Hahnemann's conception of vital reaction to disease and drug, and restated it in terms of modern biology. He showed, experimentally, that drugs can stimulate the defensive mechanisms of the body—even to the production of agglutinins in the case of baptisia—and demonstrated the action of phosphorus, veratrum viride, and others on the opsonic index. He pointed out the relation of the enhanced activity of the

homoeopathic " potencies " to the colloidal state, stressing the fact that certain agents in a very great state of subdivision stimulate ferment action, which stronger solutions inhibit, and the bearing on homoeopathy of the Arndt-Schultz Law.

Meanwhile the Sir Henry Tyler scholarships were sending a number of men to study homoeopathy under Dr. Kent of Chicago. They brought back the conception of the drug picture—that is, Hahnemann's " totality of characteristic symptoms " in patient and drug, which must match if cure is to result. Neglecting long lists of nondescript symptoms, it became possible to picture a bryonia syndrome—the sulphur type—and so forth. Such concrete conceptions greatly facilitate the practice of homoeopathy. Finally, since the war, W. E. Boyd of Glasgow has attempted to discover the nature of the stimulus which homoeopathic drugs in potency inflict on the defences of the body. He has physically demonstrated (to the satisfaction of the Horder Committee) that drugs in infinitesimal subdivision do exhibit some form of energy, and his elaborate researches are still in progress.

THE INFINITE POWER IN THE INFINITELY LITTLE

Present-day post-graduate study at the London Homoeopathic Hospital, by lectures, classes, and clinical instruction, stresses the doctrines of Hahnemann. These make their great appeal through the very things which were, of old, stumbling-blocks to their acceptance, and which are found by younger men of modern scientific training only illuminating. Cure, Hahnemann maintained, can only be obtained by vital reaction to stimulus. He taught the single remedy, previously tested on healthy humans as to its power to make sick, and then used, with foreknowledge, for the cure of like sickness: the closer the likeness, the more certain the cure. Symptoms, the reactions of the vital force against disease, constituted the appeal of the organism for the " like " remedy. Drugs were, for Hahnemann, no longer substances, but liberated energies, made potent by infinite subdivision in a perfectly simple but scientific manner. He taught the infinite power residing in the infinitely little, the impalpable, the imponderable; though radium, x rays, ferments, colloids, and vitamins had not yet appeared on the scene to provide analogies.

Even Hahnemann's prevision of the germ theory of diseases has materialized in our day, and powerful microscopes are proving his perspicacity. He wrote that chronic diseases demand special treatment, because due to, and maintained by, chronic parasitic micro-organisms—his " miasms " ; that though, by erroneous treatment, they might be driven into deeper and more vital structures, they persisted throughout life, unaffected by the most perfect hygiene or the most robust constitution, and that " the least remains of a germ could rekindle the disease." The fight between the schools has been a tragedy for both—homoeopathy, attracting always the clinician, happy in his results, and speedily overwhelmed with work that left no room for scientific investigations, which could so enormously have added to its appeal and status; and the official school of medicine, forfeiting so much of practical power by refusing the brilliant legacy bequeathed to medicine by Hahnemann.

SANITARY CONGRESS AT ELGIN

The fifty-eighth annual congress of the Royal Sanitary Association of Scotland, which began in Elgin Town Hall on September 6th, was opened by a presidential address from Mr. Hugh Begg, F.R.C.V.S., in which he dealt with the problem of bovine tuberculosis. He said that the disease remained latent in the majority of cows for many years, and their produce of milk was unaffected and wholesome. It was therefore essential that repeated veterinary inspections should be made for the early detection of clinical evidence of the disease. It was contended by some that high-pressure feeding played an important part in causing the development of tuberculosis in dairy cows, but he believed that the perpetual annual bearing of young was the chief factor in activating latent lesions. The time was more than ripe for commencing a campaign to eradicate bovine tuberculosis, and any work that helped towards eradication offered two rewards, the lowered infection of herds and a decreased communication of bovine tuberculosis to human beings. The complete stamping out of bovine tuberculosis was not an impossible proposition, for it had been accomplished elsewhere, and could be effected in Great Britain in a few years if sufficient funds were available. It could not be claimed that more than 4 per cent. of the herds in this country were tubercle-free or even approached that state. In some herds 30 to 50 per cent. of cows reacted to the first test. Attempts had been made to build up a tubercle-free herd by isolating these reactors, but failure had almost invariably resulted when these animals were retained on the same farm for any length of time. Success could only be achieved if the isolation were as complete as if the infected animals were in the possession of another individual, with separate premises, attendants, utensils, fodder, litter, etc., and without communication of any kind. Under present herd conditions, the seeds of infection were sown day by day among calves, and it was probable that 50 per cent. or more of cases of bovine tuberculosis were due to infection through milk in early days. The work done under the Tuberculosis Order was merely palliative for the better safeguarding of the consumer of milk. With increasing age the tuberculous cow tended to become more extensively diseased, and it was his view that if we could achieve a position in which dairy herds included no cows over eight years, except those that had passed a tuberculin test, there would be a greatly reduced percentage of infected animals. This would be a preliminary to some universal measure designed for the total eradication of bovine tuberculosis without any marked interference with existing interests.

PASTEURIZATION AND DISTRIBUTION OF MILK

On the second day of the congress the milk problem was the chief subject of discussion, introduced by Captain Ian S. Robertson. He said that the inspection of cows in dairies producing ungraded milk should be more drastic than at present. In view of the undoubted benefit to the health of the community which resulted from the consumption of graded milk, the Government ought to consider the cost of testing dairy herds as an insurance against the present expense of maintaining patients suffering from tuberculosis of bovine origin. Speaking on the transmission of infection by milk, Dr. A. S. M. Macgregor, medical officer of health for Glasgow, said that the danger of such infection generally could be greatly reduced by pasteurization. It had been suggested that large urban centres should be granted power to secure the compulsory pasteurization of raw milk other than that from tubercle-free herds. This view was taken by the corporation of Glasgow, and it had been resolved to apply for the necessary powers in the next provisional order to be promoted by the corporation. It would be necessary, however, that uniformly high standards of plant and management should be observed in the process. Procedure by way of securing tubercle-free dairy herds might be the ideal alternative, but this would be a slow, difficult, and costly measure, and the problem of bovine tuberculosis in children was meantime urgent. Mr. A. M. Trotter, M.R.C.V.S., chief veterinary officer of Glasgow, in a paper on rational methods of milk control, considered that the slogan " Drink more milk " ought only to be raised when the supply for a whole district was safe, and

only milk which conformed to a prescribed standard ought to be permitted to be placed on the market. He advocated the maintenance of a reserve of tubercle-free animals to replace those found to be infected in ordinary herds; in Denmark this procedure had enabled large areas of the country to be cleared of bovine tuberculosis. Many parts of Scotland, especially the Highlands, were particularly well adapted for the rearing of stock, and might be utilized for this purpose. Mr. Thomas Bishop, sanitary inspector, Edinburgh, said that the demand for high-grade milk in Scotland advanced very slowly; the number of milch-cows in Scotland was approximately 460,000, and at the present time there were only sixty-seven certified herds, comprising 3,081 cows. The distribution of milk in bottles was increasing year by year, and this practice had much to commend it, but there was laxity at present in the use of these bottles; they were often used for improper purposes, such as for holding paraffin, beer, etc., or even as flower vases on graves. It should be made an offence for anyone to use a milk bottle for any other than its legitimate purpose. The congress subsequently passed a resolution that the time had come for the revision of the nomenclature of graded milks.

HOUSING AND SLUM CLEARANCE

On September 8th a discussion took place on housing, introduced by Mr. P. C. Smith, county and town planning engineer for Lanarkshire, who said that the need for houses was more clamant than ever before, despite recent building activity. In 1911 the average number of persons per house in Scotland was 4.69, but by 1929 this had been reduced to 4.61, and in the present year to 4.21 persons per house. This showed that there was now one person less in every second house in Scotland than there had been in 1911. Another improvement had been that in Glasgow in 1921 25 per cent. of the population lived in one-roomed houses; according to the last returns only 11 per cent. now occupied such houses. Mr. Alexander L. Thomson, chief sanitary inspector to Motherwell, speaking on the question of closure and rehousing, said that the matter of dealing with the slum population was one of extreme practical difficulty. Segregation and the formation of training colonies had been suggested, and this method had been practised with success in Holland for the past ten years, a number of cities devoting special dwellings to the training of tenants, who were not self-respecting householders, in housekeeping, cleanliness, and good behaviour; when an improvement in conduct resulted, good houses were allocated to the tenants by the municipality. It was necessary that local authorities should realize that they must be more than rent collectors for their new houses, and follow up tenants transferred from bad areas and assist them to make good. The Department of Health for Scotland had issued a very serviceable memorandum on this subject.

Mr. William Easton, chief sanitary inspector, Greenock, opened a discussion on the supervision of food supply. He said that premises used for preparation and storing of food should be constructed so as to permit them to be easily cleansed, windows should be protected against admission of flies, rat-proofing should be introduced, and overalls provided for workers as well as cloakroom accommodation and washing facilities. Handling of confections sold loose should be avoided by the use of tongs or slices.

VENEREAL DISEASES

A discussion on the subject of venereal diseases was introduced by Dr. David Lees, clinical officer to Edinburgh corporation. The action of the Government and local authorities had made it possible for public clinics in Scotland in the past ten years to discharge no fewer than 40,000 cases as cured and free from infection. Ante-natal centres had also proved the great benefit of preventive treatment in regard to ophthalmia neonatorum. The deaths of newborn infants suffering from syphilis had been reduced in Edinburgh from 60 per cent. to 7 per cent. in less than fifteen years. Sir W. E. Whyte, speaking on the legislative aspect of this subject, said that the attendances at clinics set up by local authorities had last year numbered 494,901, and the amount of money spent by local authorities on this service was over £80,000 per annum. The number of defaulters who ceased to attend centres before completing a course of treatment last year was 2,663, and this illustrated the weakness of the present voluntary system of attendance.

Correspondence

END-RESULTS OF TONSIL AND ADENOID OPERATION IN CHILDHOOD

SIR,—The paper by Drs. Glover and Wilson, which appeared in your issue of September 10th, is one of very great general interest to the public and the medical profession, and merits our careful attention. It has established one undoubted fact—namely, that the annual increase of the operation in the course of eight years has been more than doubled in the public elementary school children of this country. It seeks to find reasons for this, and whether they are justified or not.

Much credit is due to them for their painstaking search of a large part of the literature of Europe and America which deals with any statistics bearing on the subject, with the object of testing the value of the operation in relation to the patients' subsequent health; but, unfortunately, what may have been a helpful piece of evidence in Tables II and III is not so, owing to the use of somewhat contradictory terms. As Dr. Sington very aptly points out in your issue of September 17th, tonsillitis arising in a tonsillectomized patient should be an impossibility, and therefore the only inference one can justly draw from the statement that a patient suffered from a recurrent inflammation of an organ which was supposed to be removed is that the operation performed was imperfect, and for this reason a failure.

The word "tonsillectomy" needs no definition to convey its full meaning: to me it does not include removal of adenoids. It is common knowledge that partially removed tonsils and adenoids are often found to be more prone to recurrences of inflammation and the production of systemic infections than those left intact. But even when the tonsils and the definite adenoid mass in the nasopharynx are perfectly removed there still remains a complete sheet of lymphatic or adenoid tissue in the deeper layer of the mucous membrane lining the nose, post-nasal space, pharynx, and base of the tongue, any part of which in children and adolescents is, in an extraordinary degree, susceptible to inflammatory reactions in the presence of any microbic infection. So we have still this vast area left which is receptive to invasion by epidemic or even particulate infections. I am emphasizing this point to show the fallacies which must necessarily underlie such a line of investigation, and not because I am concerned to defend anything approaching a routine removal of tonsils. My views on the latter are the direct opposite, as in my own clinic, and in others I know of, the cases are subjected to very careful selection—which should be so in all clinics. This is the surest way of maintaining the credit of the operation. It seems to me a self-evident proposition that tonsils which the considered judgement of an experienced surgeon pronounces to be healthy and no menace to the well-being of their owner at the moment, should not be removed as a prophylactic measure. If, however, they are definitely pathological, their efficient removal is a wise and valuable

procedure, giving often the most gratifying result to be seen in surgery, and one which cannot be questioned on the score of its failure to prevent susceptibility to upper airway infections of an epidemic nature. There is no experienced observer, no matter what function he may or may not assign to the tonsil, who can place the claims for its removal so high.—I am, etc.,

London, W., Sept. 19th. JOHN F. O'MALLEY, F.R.C.S.

POLIOMYELITIS: DRINKER'S RESPIRATOR

SIR,—A short time ago I was called in the very early morning into consultation over a young man who had developed paralysis of his respiratory muscles. The practitioner had arranged for relays of men to carry on artificial respiration. The patient had had slight pyrexia, and severe pains suggesting acute anterior poliomyelitis, but was feeling better; he said, "Quite well, except that I cannot breathe." He had no inkling that the condition was grave, and joked with those around him. In consultation we decided that life must be prolonged to the uttermost, even if it entailed suffering, because occasionally, although comparatively rarely, some of the muscles paralysed at the onset of the disease regain their function within a few days. I knew that there was an automatic respirator in London, but did not know whether it was available, and if so, how long it would take to install.

We decided that intratracheal oxygen should be administered as soon as possible, and this was done with great skill by Dr. Challis, who gave sufficient nitrous oxide to prevent the patient resenting the tube through his larynx. Many circumstances delayed the arrival of Drinker's respirator, and the patient had had artificial respiration for fifteen hours before it was ready. The relief it afforded not only to the patient, but also to all those who were responsible for his immediate well-being, impressed me immensely. The facility with which he was introduced into the machine by an inexperienced crew under the direction of Sir Robert Davis proves that it is a machine which is well fitted for general use. Unfortunately the disease was extending rapidly; more nerve cells became involved, and the patient survived only a few hours.

Admissions to the London Hospital make it probable that an epidemic of poliomyelitis is developing. The object of this letter is to inform the medical profession that a Drinker's respirator may be obtainable by applying to Sir Robert H. Davis, 187, Westminster Bridge Road, S.E.1.—I am, etc.,

London, Sept. 9th. O. LEYTON.

BLOOD TRANSFUSION

SIR,—Several correspondents have written to you criticizing Mr. Geoffrey Keynes's method of blood transfusion, described in his letter in the *Journal* of August 27th. Many of these criticisms seem to be based on the supposed sufferings of the donor when Keynes's method is used.

As one who some months ago acted as a donor in the skilful hands of Mr. Keynes, I should like to say that I was unconscious of what he was doing until I heard the blood running into the flask. I had no pain at all, and did not even feel him insert the novocain needle. The tiny nick healed very rapidly, the dressing being removed, I think, on the next day. The recipient's incision had, I believe, two stitches, and also healed by first intention without the slightest inconvenience. Both donor's and recipient's veins have remained patent.

I feel impelled in justice to Mr. Keynes and his method to write this letter.—I am, etc.,

A. C. ROXBURGH, M.D., F.R.C.P.

London, W., Sept. 13th.

SIR,—With regard to the recent correspondence in your columns on blood transfusion, I think it will be found that all intravenous technique (both for injections and for the withdrawal of blood) is greatly simplified by the employment of needles the bevels of which are flat and of medium length only. This fact appears to be consistently overlooked by manufacturers. Naturally, the point of the needle must be as sharp as it is possible to get without sacrificing the essential nature of the bevel. As a corollary it is of the greatest importance that all such needles should be frequently sharpened.—I am, etc.,

Montana, Switzerland, Sept. 17th. HILARY ROCHE.

SIR,—I have read with dismay the correspondence that has trickled through your columns since July on blood transfusion. Those who advocate novocain and "snicks" will, I am sure, abandon both when they realize that a really sharp needle eliminates the necessity of either. I would also like to draw their attention to the Jubé syringe, which is so simple as to make other methods appear complicated and unnecessary.—I am, etc.,

B. BARLING, M.D., M.R.C.P.,
Senior Assistant Medical Officer,
Highgate, N., Sept. 15th. St. Mary, Islington, Hospital.

NITROUS OXIDE AND OXYGEN IN REDUCTION OF COLLES'S FRACTURE

SIR,—As an anaesthetist I must protest against the opinion expressed by Dr. Bartleman and Mr. Tippett, in their letter of September 10th, that "Colles's fracture should never be reduced under N_2O, because in the majority of cases it is impossible to obtain the necessary muscular relaxation so essential for correct reduction of the fracture."

With the aid of suitable premedication—my personal preference is for ten grains of chloretone three-quarters of an hour before the time of manipulation—in the majority of cases it is always possible to obtain the necessary muscular relaxation so essential for the correct reduction of the fracture by the administration of nitrous oxide and oxygen.

No doubt one reason why nitrous oxide fails to satisfy the exacting requirements of modern orthopaedic standards is that the phrase "just a whiff of gas" is too often synonymous with the unskilled use of nitrous oxide, and under such conditions the resulting state of semi-asphyxia will effectively prevent muscular relaxation.

The unskilled use of nitrous oxide and oxygen hardly provides adequate grounds for the complete condemnation of an anaesthetic which, when administered by a professional anaesthetist, or by hospital "residents" who have the benefit of tuition in its proper administration, is of proven value not only in the reduction of Colles's fracture, but also in many other orthopaedic manipulations requiring muscular relaxation.—I am, etc.,

Manchester, Sept. 12th. H. K. ASHWORTH.

ACUTE INTESTINAL OBSTRUCTION

SIR,—Your leading article on this subject states that "cases of intestinal obstruction come into our hospitals most often in the evening, when the students have no opportunity of observing them, and they only see this type of case after operation." As regards the Middlesex Hospital and its Medical School this statement is completely misleading. Dressers attached to the surgeons dealing with emergencies of this type are in attendance continuously, both by day and by night, and no case is admitted to the wards or goes to the operating theatre without a full consultation at which the dressers, as well as the members of the honorary staff concerned, are present. It is chiefly with a view to securing full experi-

ence of this class of case that our dressers are provided with accommodation in the hospital. I believe that similar provision is made in many of the London hospitals.—I am, etc.,

T. IZOD BENNETT,
Middlesex Hospital, Sept. 17th. Dean of the Medical School.

PUERPERAL FEVER: A POSSIBLE CONTRIBUTORY DANGER

SIR,—In these days, while rightly giving warnings of *external* danger, do we adequately caution the young doctor of a particular peril *within* the patient?

When first engaged in obstetric practice I soon had to learn clinically a lesson which my teachers had not taught me. It was that puerperal septicaemia often quickly causes severe spasmodic closure of the cervix at the os internum, and that to give a uterine douche is not always so easy a matter as many think. To douche the uterus in such cases it is necessary to introduce into the vagina as much of the left hand as is required for its fingers to guide the tube, which the right hand pushes through the os externum up to the spasm, the fingers of the left hand maintaining their guidance. Success is attained when the contraction yields to the pressure of the tube, and it does so at times with a well-marked jerk, such as that perceived in the overcoming by a catheter of a urethral spasmodic stricture.

I gradually discovered that other practitioners were sometimes quite unaware that toxaemic spasmodic closure of the cervix was apt to develop early in feverish lying-in women, and it was evident to me that occasionally, when it was thought that the uterus had been syringed out, not a drop of the fluid had found its way inside it. They seemed to rely on merely reaching the os uteri with the left index finger, and, passing up the tube to it with the right hand, gently pushing this instrument upwards—an action which causes the contact between the left index finger and the os uteri to cease, while the tube forthwith slips behind the tightly closed cervix, the attendant imagining that it has passed through it into the uterine cavity.

These mistakes do not occur in hospitals, where obstetric difficulties are appreciated and facilities for a minor operation are ever present; but maternal mortality is still high in England and Wales, and we do not know all that happens in countless homes up and down the country. In spite of teaching and warnings against this danger opportunities can only rarely arise of illustrating it clinically. Instruction concerning it must of necessity generally remain in the lecture theatre or in books, but it should be rubbed in and driven home, and examiners should question candidates upon it.—I am, etc.,

Liverpool, Sept. 12th. GLYNN WHITTLE.

PUERPERAL FEVER AND THE MIDWIFE

SIR,—Referring to Dr. Robson's letter of September 10th, this indictment against the menstruating woman is neither new nor confined to her attendance on parturient women. Among nearly all the native races, women and girls during their menses are "taboo" as unclean. (See Briffault, also Crawley's *The Mystic Rose*.) In Devonshire, not many years since, I was assured by a farmer's wife that if her daughter were allowed in the dairy when "unwell" the milk would "turn," and also that pork would become "bad" if her hand touched the brine. She also said that this effect was independent of the seasons or of thundery weather. My doubts on her observations were, however, aroused when she added that a gipsy curse would interfere with the success of the churning operations. Yet her weather prognostications were as reliable, so far as I could carefully judge, as the published meteorological reports.

The primitive country folk often appear to be sensitive to subtle influences which cannot be registered by scientific instruments, so that before scoffing at what I cannot understand or believe, as an amusement or mental exercise I sometimes try to make common sense out of a lot of seemingly unrelated facts. Probably the scientist, bacteriologist, or medical officer might suggest some common denominator to assist in this respect.—I am, etc.,

Southampton, Sept. 12th. ARTHUR KING, M.D.

INJECTIONS OF OXYGEN

SIR,—The kindly spirit shown by Dr. Argyll Campbell in this correspondence makes me feel sure that nothing but good, even for patients, can come out of it. He will admit that a single word or phrase may make a lot of difference, as shown by his statement in the *Physiological Review*, 1931, to which he refers. In it he says: "It is *possible* that in dyspepsias air is swallowed to supply oxygen to an abnormal mucous membrane." (Italics are mine.) On the other hand, I have shown that *oxygen is of actual value* in dyspepsia, gastric ulcer, debility, and anaemia, and I have drawn attention to the ready way by which milk can be easily oxygenated for introduction to the stomach, rather than that it be left to some chance "swallowing of air." Dr. Campbell's other statement that "the oxygen of the air swallowed diffuses through the mucous membrane which is very vascular" is of great value because it seems to confirm my contention that oxygen introduced by means of oxygenated milk passes into the blood vessels and lymphatics, and by so doing is able to help in the oxidation of the penultimate products of digestion.—I am, etc.,

Swansea, Sept. 17th. G. ARBOUR STEPHENS.

MEDICAL PRACTICE IN FRANCE

SIR,—Some months since the French Parliament passed a measure providing that in future no one would be permitted to practise medicine in France unless he possessed or acquired the French nationality. I am surprised that, as far as I am aware, no protest has been entered against this extraordinarily arbitrary provision, which simply means that in future English residents in, and visitors to, France will not be afforded the consolation of being able to secure the services of a practitioner of their own nationality. I think our Government ought to enter a diplomatic protest against this law, which is, of course, merely masked Protection. It does not, I imagine, apply to those of us who have been practising here for years past, but it will effectually exclude newcomers.—I am, etc.,

Algiers, Sept. 12th. ALFRED S. GUBB.

BOVINE AND HUMAN TUBERCULOSIS IN JAPAN

SIR,—I am afraid Mr. William S. Stevens has missed the essential point in my letter. The fresh evidence from Japan clearly shows that in Japan bovine tubercle bacilli do not play a great part in human tuberculosis—3.8 per cent. This fact strengthens my argument.

The truth is that conditions in Japan in Kitasato's day provided the basis of an extraordinary experiment under natural conditions. Cattle *of the Japanese breed* do not suffer from bovine tuberculosis and are naturally immune. "Milch-cows" in Japan are not likely to be of the Japanese breed, because in Japan the cow is holy and young children are not fed on milk. Nowadays there are cows of *mixed breed* in Japan, and the natural experiment is marred. Kitasato's argument remains, and I have nothing to add or retract.—I am, etc.,

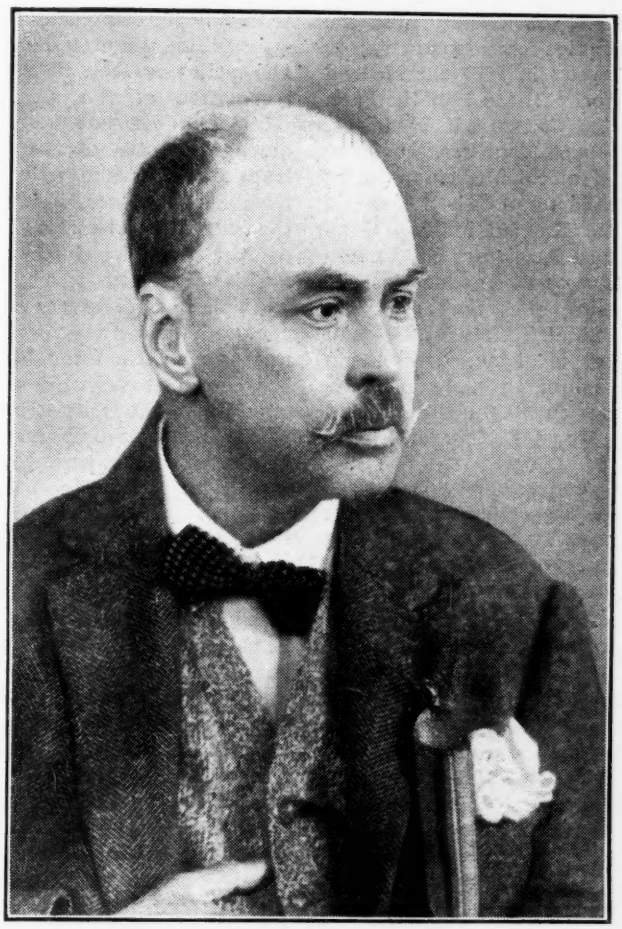
London, W.1, Sept. 18th. W. CAMAC WILKINSON.

Obituary

SIR RONALD ROSS, K.C.B., K.C.M.G., M.D., LL.D., D.Sc., F.R.S.

We have to announce with great regret the death on Friday, September 16th, of Sir Ronald Ross, at the age of 75. He had been lying gravely ill for many weeks past at the Ross Institute and Hospital for Tropical Diseases, Putney Heath, of which he was director-in-chief.

Ronald Ross was the son of General Sir Campbell Claya Grant Ross, K.C.B., Bengal Staff Corps, and was born at Almora in the Kumaon Hills, on May 13th, 1857, a few days before the great Indian Mutiny began; his father was stationed there as a captain in the 66th Gurkhas. He was educated at St. Bartholomew's Hospital and, after taking the M.R.C.S. and L.S.A. in 1881, entered the Madras Medical Service as surgeon on April 2nd, 1881. The race is not always to the swift nor the battle to the strong, and it is worthy of note that Ross, by far the most distinguished member of the I.M.S. of his generation, entered that service with no University degree, and passed in sixteenth out of twenty-two successful candidates. Practically his whole service in the I.M.S. was spent in military employment. The life of a regimental medical officer, in those days, exacted little professional work, and Ross's abundant energy had to find scope in other directions. At first he turned to literary work, writing several novels and plays, but later took up scientific research. In 1892 he began the study of malaria, in search of the causes of that disease, which works such havoc in India and throughout the East. In 1895 he undertook the experimental verification of the mosquito theory of malaria, which had been suggested to him by Dr., afterwards Sir Patrick, Manson; and in 1897–8 met with complete success in tracing out the life-history of the malaria parasite in the mosquito. He had served in the Burma war in 1886, receiving the frontier medal with a clasp, and in 1895 won the triennial Parkes Memorial gold medal and prize for an essay on malaria. In 1896–9 he was on special duty to report on kala-azar. After his important discoveries the prizes of the profession in India would have been open to him had he remained in the Service. But his health had suffered from long residence and close application to study in a tropical climate, and he found it advisable to retire from the Service, as a major, on July 31st, 1899.



On his retirement he became lecturer on tropical diseases in the Liverpool School of Tropical Medicine in 1899, the title being changed to professor in 1902. During the twelve years following his retirement he organized and directed, as leader, many expeditions to tropical and semi-tropical climates, in the fight against malaria—to Sierra Leone in 1899–1900; West Africa, 1901–2; Mauritius, 1907–8; Spain, Cyprus, and Greece, 1912. In 1912 he moved to London, where he was appointed physician for tropical diseases to King's College Hospital, but retained the post of professor of tropical sanitation in the Liverpool School, delivering there an annual course of lectures.

In 1908 he had taken a commission as major in the Territorial Force of the R.A.M.C., and in November, 1913, became lieutenant-colonel therein, on the staff of the 1st Western General Hospital, Liverpool. Soon after the beginning of the great war, on December 21st, 1914, he was appointed consulting physician for tropical diseases to the base hospitals for Indian troops in England, and in July, 1915, was sent to Alexandria to conduct an inquiry into the prevalence of dysentery in the Army in the Dardanelles. On February 15th, 1917, he was appointed consultant for malaria to the War Office, and in 1917 was sent out to Salonika on a malaria inquiry. He was given the rank of temporary colonel in the R.A.M.C. from February 5th, 1918, and in October, 1919, was demobilized, with the rank of colonel in the Territorial Force Reserve of the R.A.M.C. After this retirement he became consultant for malaria to the Ministry of Pensions. For his war services he received the K.C.M.G. on June 3rd, 1918.

Many honours, both from the State and from scientific bodies, were conferred on Ross, beginning with his great discovery, and going on through the next twenty years. He had gained the Parkes Memorial gold medal, the scientific prize of the State Medical Services, in 1895. In 1901 he received the silver medal of the London Society of Arts; the honorary Fellowship of the Royal College of Surgeons of England; and the Fellowship of the Royal Society. In 1902 he was given the C.B.; the Cameron prize of Edinburgh University; and, in December, the Nobel prize in medicine. In 1903 he received the Barclay bronze medal of the Asiatic Society of Bengal; in 1904 the degree of D.Sc. from Trinity College, Dublin; in 1906 the grade of officer of the Order of Leopold II of Belgium, and the LL.D. of Aberdeen University; in 1909 he was knighted, received the D.Sc. of Leeds, and was given the Royal gold medal of the Royal Society. In 1910 the degree of M.D. Stockholm was conferred on him; in 1910 he received the K.C.B.; and in 1912 the M.D. of Athens. In 1913 he was made Officer de l'Instruction Publique, France; in 1914 he got the Bisset-Hawkins gold medal of the Royal College of Physicians, London; in 1915 he was made a Freeman of the Society of

Apothecaries ; and in 1918 was gazetted K.C.M.G. for his services in the war. In 1922 he was elected a member, under Rule II (scientific distinction), of the Athenaeum Club ; in 1923 he received the Albert medal of the Society of Arts, in 1928 the gold medal of the Royal Institute of Public Health, in 1929 the Manson memorial gold medal and the gold medal of the West London Medico-Chirurgical Society.

Some thirty societies have, from time to time, conferred on Ross their membership or fellowship—the term varies—in 1901 the Medical Society of the Dutch Indies, Batavia ; in 1902 the Medical Society of Ghent ; in 1903 the Societas Medicana Svecana, the Royal Physiographic Society of London, the Manilla Medical Society, the American Society of Tropical Medicine, and the Paris Society of Tropical Medicine and Hygiene ; in 1904 the Lancashire and Cheshire Entomological Society, and the Paris Academy of Medicine (foreign correspondent) ; in 1906 the Malaria Society of Greece ; in 1907 the Medical Society of Turin (foreign correspondent) ; in 1908 the Paris Society of Exotic Pathology, the College of Physicians, Philadelphia, the Medical Society of Mauritius (honorary president), and the Society of Tropical Medicine, Cuba ; from 1909 to 1911 he was president of the Society of Tropical Medicine, London ; the Russian Malaria Commission and the Imperial Military Academy, St. Petersburg, in 1912 ; the Harveian Society of London and the Institute of Hygiene, London, in 1913 ; the Society of Sciences, Upsala, and the Biological Society of Belgium in 1919 ; the School of Tropical Medicine, Brussels, in 1920 ; the Royal Society of Edinburgh and the Paris Academy of Medicine (Associate) in 1920 ; the Medical Society of Turin (Fellow), the Royal Society of Literature, London, in 1922.

Throughout his career Ross was a most prolific author. Besides a large number of reports on the results of his scientific work, and on the progress of the antimalarial campaign, he published the following works, covering a period of forty-eight years: *Edgar, or the New Pygmalion*, and *The Judgment of Tithonus* (two plays), 1883 ; *The Child of Ocean* (romance), 1889, reissued in 1932 ; *The Deformed Transformed* (play), 1890 ; *The Spirit of Storm* (romance), 1896 ; *Malarial Fever, its Cause, Prevention, and Treatment*, 1902 ; article on "Malarial Fever," in *Quain's Dictionary of Medicine*, 1902 ; *Mosquito Brigades, and How to Organize Them*, 1902 ; *Researches on Malaria, the Nobel Prize Lecture of* 1902, 1906 ; *In Exile* (poems), 1906 ; *Fables*, 1907 ; article on "The Public Prophylaxis of Malaria," in Allbutt's *System of Medicine*, vol. ii, Part II, 1907 ; *Philosophies* (poems), 1910 ; *The Setting Sun* (poem), 1912 ; *Psychologies* (short dramas), 1919 ; *The Revels of Orsera* (romance), 1920 ; *Memoirs*, 1923 ; *Poems*, 1928 ; *In Exile*, 1931.

In 1889 he married Rosa, daughter of E. Bloxam, and has one son, in the Army, and two daughters, the elder of whom married Lieut.-Colonel J. W. Langstaff, D.S.O., R.A.M.C. Lady Ross died in 1931.

At the annual meeting of the British Medical Association at Ipswich in 1900 Sir Ronald Ross was vice-president of the Section of Tropical Diseases and served as its president in the following year at Cheltenham. He had accepted the office of vice-president of that Section for the Centenary Meeting in London.

Sir MALCOLM WATSON, director of tropical medicine and principal of malaria department, Ross Institute, writes:

Even to those who have known Ronald Ross intimately and who have watched a long illness draw to an inevitable end, his death has come as a blow. To the outside world Ross was the critic, the satirist, the "dour" fighter ; but that was only one side of his character—if, indeed, it was anything more than a veneer. Time and again he has told me his work was not done for any love of science ; it was done for the sake of the sick. Since 1889 his life has followed an undeviating line, first the study of the cause of malaria, then the method of its spread, and since 1899 the promotion of measures to abolish the disease. It was the abiding remembrance of the sickness and death seen first in his Indian hospitals that inspired his work and directed his life. His clear-thinking mind saw the enormous sum of misery throughout the world caused by malaria, and made him an uncompromising critic of everything and everyone who hindered the work of the prevention of disease. On one occasion I suggested he might soften an expression, but my arguments and appeals were absolutely without effect. "What I write is true," he said. "It should be said, if the world is to know the truth. I am completely indifferent to the consequences"—and there the matter ended as far as he was concerned. His genius reached its zenith, so it seems to me, in his recognition of the significance of the few grains of motionless pigment in otherwise colourless cells lying among the cells of the stomach wall of the mosquito. But how clear and well balanced was his mind is seen from his insistence, in the very first paper he wrote on the prevention of malaria immediately after his discovery, on the need for further "experiment and research" if his discovery was to be utilized. Not even the triumph of a discovery of first importance to the world confused his thoughts. There is something almost uncanny in this foresight when we remember how time has shown that within a few miles of country directly opposite methods have been required to control malaria when the disease is carried by anopheles of different habits. The "experiment and research" was to be on a scale larger both in space and time than our profession visualized, which is the real explanation of the delay in putting the discovery to use ; a delay that caused Ross much unhappiness and developed the veneer of which I have spoken. He certainly did not seek money for its own sake ; but he claimed reward for work done, because he believed that research essential for the welfare of the Empire could not be done unless the man doing it was paid in some shape or form, preferably after he had shown he was capable of doing more than what may be called routine investigation. With money Ross was generous to a fault. To younger men he gave help as unstintingly as he had received it from Manson. In all the years that I have known Ross, and among all his criticisms of men and work that I have heard, there was not a word inspired by meanness or jealousy. Ross had a mind that pierced to the centre of a problem or an action, and a gift of expressing his thoughts which he used with deadly effect on those who crossed his path. When he criticized adversely he gave reasons for doing so. On the other hand, he was generous in his praise to all who were struggling to advance our knowledge of medicine and the prevention of disease. Many men all over the world will bear testimony to the stimulating help they have received from Ross. He was, in fact, a kindly and genial man, loved by those around him, and not at all the "awful presence" which makes a chief unapproachable. His long and at times painful illness was borne with patience ; he made no complaint as he saw the end approach, although he often spoke of it. There was always a welcome when I went to see him, and always an almost formal good-bye when I left. To the very end his mind, although far from clear, was active on some problem, or he was thinking and worrying how he could help someone. To serve others was the motive of Ross's life, and that it persisted to the end is the true measure of its strength.

Dr. G. CARMICHAEL LOW, President of the Royal Society of Tropical Medicine and Hygiene, writes:

The death of Sir Ronald Ross removes another of the great pioneers of tropical medicine, and one not easily to be replaced. His name, however, will live for all time as the discoverer of the transmission of malaria by the mosquito, and the results rendered possible by this discovery are a gift to posterity. As all know, Ross joined the Indian Medical Service in 1881, and was appointed to its Madras branch in the same year. For the first years of his service he did little of note, but after Laveran's discovery of the malarial parasite his interest in that subject was aroused, an interest which was strengthened after the meeting with Manson in 1894, which led to such great results. On his return to India in 1895 Ross tackled the subject in earnest and with such energy and resolution that eventually he solved the problem, thus adding another illustrious achievement to British medicine.

When one looks back upon this epoch-making work, the thing that impresses itself most upon one is that it was done under the greatest difficulties and often against definite official opposition. There was also no one at hand to help, and he had to rely entirely for any encouragement on Manson, who was many thousands of miles away. Yet in face of all these obstacles he triumphed, and, moreover, worked out in such accurate detail the life history of the malaria parasite in the mosquito that practically nothing has been added to our knowledge of this since. This is one of the most wonderful points in Ross's work. There is no question that Ross was a genius. No one but a genius could, without any practical laboratory training, have accomplished such a piece of work. A wonderful versatility is also shown by his contributions to mathematics, literature, and philosophy.

Ross's life in England after leaving India was an arduous one. Disappointed in some ways that more practical application of his discovery had not been made, he strove his utmost to bring this to the notice of the medical world at large, not only in his first days at the Liverpool School of Tropical Medicine, but right up to the end of his life at the Ross Institute at Putney, founded to perpetuate his name. Ross was the second President of the Royal Society of Tropical Medicine and Hygiene, following Manson in that position. While holding this post he advanced tropical medicine in many ways, and he never lost his interest in the society. In 1929 he was awarded the Manson medal, and a few months ago, when Manson House became the home of the society, he came there to be photographed with the council of which he was an honoured member.

Of an ardent temperament, it was difficult for him to cope with inanition and incompetence; and his desire to overcome these sometimes made him appear pugnacious. His energy and enthusiasm for his work were boundless, and he never spared himself in carrying out his schemes for the prevention and stamping out of malaria. For this purpose he visited many parts of the world, such as the West Coast of Africa, Ismailia, and Mauritius. His memoirs, written by himself, give some idea of what he accomplished. He was also appreciative of the work of others, and was always pleased to help young men beginning their careers.

Many honours came to Ross, including the Nobel Prize in 1902. He was especially gratified by the foundation of the institute at Putney which bears his name; and also by the testimony of appreciation the nation made to him in his closing years. The world will never forget him: the names of Manson and Ross will go down to posterity together with those of Pasteur, Lister, and other benefactors of our race. The British nation should indeed be proud of the part its sons have borne in the elucidation of the problems of tropical medicine.

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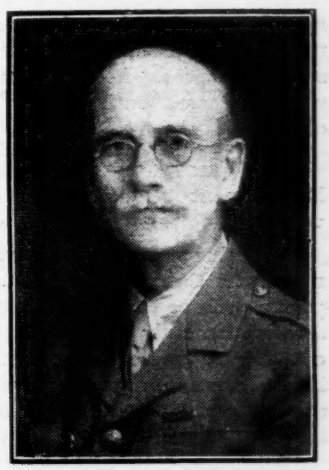
SIR CHARTERS SYMONDS, K.B.E., C.B.,

M.D., M.S., F.R.C.S.

Consulting Surgeon to Guy's Hospital

Sir Charters James Symonds, who died on September 14th at Harrow, was born at Dalhousie on July 24th, 1852, and belonged to one of the distinguished families of the Province of New Brunswick. The ancestor of the family in America sailed from London in the seventeenth century and settled at Woburn, Massachusetts. In 1763 James Simonds migrated to Acadia, receiving a grant of land at the mouth of the River St. John. One of his sons, the grandfather of Sir Charters, was a member of the Legislative Council in 1828, Speaker of the House of Assembly, and Provincial Treasurer.



Having decided to study medicine, Charters Symonds came to London in 1870 and entered Guy's Hospital. His career as a student was remarkably successful. In 1875 he won the gold medal for surgery and obtained the M.R.C.S. In 1876 he was appointed junior demonstrator, and in 1877 was promoted to senior demonstrator of anatomy in the Medical School. In 1877, in his examinations for the M.B. degree at the University of London, he obtained first-class honours in medicine, forensic medicine, and obstetrics, with a gold medal in each of the two latter subjects. He also obtained the B.S., with first-class honours and gold medal. In 1878 he proceeded M.D., and shortly afterwards became surgical registrar at Guy's. He obtained the M.S. degree and the Fellowship of the Royal College of Surgeons in 1881. In the following year he was elected assistant surgeon to Guy's, and in 1902 was promoted full surgeon and lecturer on surgery in the Medical School. In 1912, on reaching the age limit, he was appointed consulting surgeon. From 1907 to 1923 he was a member of the Council of the Royal College of Surgeons, and vice-president in 1916, in which year he gave the Bradshaw Lecture; in 1921 he was Hunterian Orator. He had been president of the Medical Society of London, of the Hunterian Society, and of the Clinical Section of the Royal Society of Medicine. For some years he was surgeon to the Evelina Hospital for Children and consulting surgeon to a number of charitable institutions in and near London. At the Annual Meeting of the British Medical Association in Birmingham in 1890 he was vice-president of the subsection of Laryngology and Rhinology; and at the Oxford meeting in 1904 he was president of the corresponding section.

He had served six years as surgeon of the King's Colonial Yeomanry, afterwards King Edward's Horse, and in 1908, on the creation of the Territorial Force, he became a major on the staff of the Second London General Hospital. When war broke out in August, 1914, he was called up, and at once assumed active duties, with charge of wards. In 1915 he was appointed consulting surgeon to the Eastern Command, with the rank of lieutenant-colonel, and shortly afterwards was sent out as consulting surgeon to the Forces in the Mediterranean, with the rank of colonel. He had a busy time at the hospital base in Malta with the wounded from the Suvla Bay landing. In April, 1916, he was transferred to Salonika, and assisted in setting up the equipment for

thirty thousand wounded and supervising surgical work. In the following July he was sent home invalided, mentioned in dispatches, and received the C.B. (military), but shortly afterwards was posted to the Southern Command, and, as consulting surgeon at Netley, supervised the surgical work from Portsmouth. On July 1st, 1919, after nearly five years of war service, he was created K.B.E. in the military division.

Retirement from active practice gave Sir Charters Symonds leisure for much service in good causes. He became treasurer of the Royal Medical Benevolent Fund, chairman of the Invalid Children's Aid Association, and chairman of the Children's Hospital at Hampstead. He was also for some years a member of the Advisory Committee to the Home Secretary on vivisection licences. In 1929 the University of New Brunswick conferred on him the honorary degree of Doctor of Laws.

Sir D'ARCY POWER, chairman of the Committee of Management of the Royal Medical Benevolent Fund, writes:

Philanthropy was a marked feature in the mental make-up of Sir Charters Symonds. It was partly ingrained, partly perhaps the result of experience. The *res angusta domi* of his early life and the necessity of self-support by coaching at the beginning of his professional career taught him the value of money, with what difficulty it was earned, and how easily it was spent. He had always, therefore, a great sympathy with those who had failed in medicine and had either become destitute themselves or had left dependants with insufficient means of support. The work of the Royal Medical Benevolent Fund appealed especially to him, first as a member of the Case Committee and more recently as treasurer. What he did, he did without counting the cost to himself. So long as he was well enough he came to the office almost daily, and spent, not minutes, but hours, in considering the applications and making himself master of the facts connected with individual applicants. At committee meetings he was thus able to give valuable advice about the amounts of the grants to be made. As treasurer he was equally successful, and it was a matter of supreme satisfaction to him when it was stated in the ninety-sixth annual report, issued on March 15th of this year, that "the income for the year is the largest since the foundation of the Fund." It had increased from £8,000 in 1921 to £17,700 in 1931, and, what to him was equally satisfactory, 675 grants had been made and 199 annuitants had been comforted in place of a meagre 241 and 178 respectively. It was a cause of grief that illness prevented his attendance at the conference on the medical charities during the Centenary Meeting of the British Medical Association last July in London.

As a surgeon Charters Symonds was one of the fast-diminishing body who saw, and had taken an active part in, the surgical revolution. Brought up in the old school, he watched the growth of Listerian practice as it was enunciated at Guy's Hospital by Sir Henry Howse. He observed the early mistakes and avoided them. He passed cautiously through the period of joint excisions and emerged a conservative surgeon. His alert mind saw the advantages of Listerian surgery, and he soon became a leading exponent of abdominal surgery as practised by a general surgeon in a large teaching hospital. He was brilliant as a teacher of students. Lacking the sarcasm of his remarkable colleague Mr. W. H. A. Jacobson, he drove knowledge into his pupils by impressing upon them the need for a sound basis of pathology and the habit of accurate observation. He instilled into them, too, the tact and kindliness of manner of which he was himself a master. This knowledge and these habits became of supreme value during the great war. The experience gained when he was a dresser and many wounds suppurated enabled him to treat successfully a type of wound with which his younger colleagues were unfamiliar. His conservatism taught him not to advise operation too hurriedly; his tact and geniality enabled him to work harmoniously with others and at the same time to promote harmony amongst jarring elements. If his character had to be summed up in a single word it would be expressed by Humanity.

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T. H. C. STEVENSON, C.B.E., M.D.

Late Superintendent of Statistics, General Register Office

Thomas Henry Craig Stevenson, son of James Stevenson of Strabane, co. Tyrone, was born in 1870 and was educated at University College, London. He qualified M.R.C.S., L.R.C.P., and graduated M.B.Lond. in 1896, and proceeded M.D. (State Medicine) in 1902. He entered the Public Health Service as an assistant school medical officer of the London County Council in 1905; in 1908 he became school medical officer to the Somersetshire County Council. A year later he was chosen to succeed Dr. John Tatham as Superintendent of Statistics in the General Register Office. His appointment coincided with that of a new Registrar-General, and the four pre-war years of his service formed a most fruitful epoch in the history of English official vital statistics. During the war many demands were made upon his energies, and it may be that those strenuous days undermined his constitution. He was, however, able to work hard and successfully for several years longer, but some little time before his retirement it was evident that he was feeling the strain. More than a year ago it became clear that rest from official duties was imperative, and he retired from office in August, 1931. It was too late; his health continued to fail, and he died on September 12th, 1932.

Stevenson was the fourth holder of an office created for William Farr. Farr's immediate successor, Ogle, will be remembered rather as an accomplished Greek scholar than as a statistician. The combination of quaintness and genius which made any volume of the long series of annual reports for which Farr was responsible entertaining as well as instructive, was no longer to be detected. Tatham was more interested in statistics than Ogle, and introduced various improvements, especially, perhaps, in the tabulation of mortality from cancer, but the annual reports of his time continued to be rather dull. Stevenson changed all that. Superficially nobody could have been less like Farr. Farr, although not a Welshman (he was of Shropshire stock), had much of the intellectual restlessness and excitability which are popularly attributed to the Celtic temperament. Stevenson was an Ulsterman, slow of speech, cautious in statement, and, far from being prone to overrate the numerical method, was habitually inclined to underrate his own technical knowledge. Fundamentally, however, the two men were much alike. Both were consumed by a desire to make medical statistics an instrument for the relief of human suffering. In his official writings Stevenson put a restraint upon himself which Farr never knew, but very little study of the reports and a quite superficial acquaintance with the man himself would be enough to convince any intelligent person that Stevenson was as alive to the preventive medical aspect of his work as Farr himself. Indeed, in his later years—in writing, for example, on the mortality of illegitimate infants in the first minutes of life—the righteous anger of a tender-minded man breaks through the restraints of an official style as effectively as in the days of Farr. Again, year after

year, one may read, following an analysis of the regional variations of mortality from pneumonia, some such comment as this: "Evidently pneumonia is to a large extent a preventable disease, and the North of England has still much to learn with regard to its prevention."

Stevenson enjoyed two advantages over his predecessors. His accession to office almost coincided with the beginning of a new system of tabulating vital statistical data, by units of administration instead of by registration districts. This change, at the price of destroying some measure of historical comparability, gave a reality to the data which they had begun to lose. Again, in the first census with which he was officially concerned, questions were introduced, notably that relating to the fertility of marriages, which had not before been thought practicable. The four annual reports for 1911 to 1914 and the analysis of the census of fertility are, from some points of view, Stevenson's most important writings; not that his powers deteriorated (he continued to produce work of the highest quality down to his retirement), but because over that period our vital statistics were in continuity with the past and undisturbed by the effects of war.

In a letter published in these columns little more than a year ago and bearing the signatures of the Presidents of the two Royal Colleges and of the Royal Statistical Society, attention was directed to, *inter alia*, Stevenson's work on infant mortality. Already, in the first report of the new series, that on the year 1911, one finds an essay on the causes of infant mortality, based upon an elaborate and *clear* tabulation, of much more value than anything before published. In subsequent issues minor improvements were effected, but twenty years ago the foundations were well and truly laid. Had Stevenson done nothing else but his work on infant mortality his reputation as a vital statistician would be secure. Of course, he did much more. In his time the statistical study of cancer was carried much further than before. In the annual report on 1913 Stevenson provided a wholly convincing demonstration that "during the period of active sexual life there is practical equality of mortality from breast cancer among the single and the married, but that after 45 the excess among the single becomes very pronounced"—a conclusion which has since been, sometimes, challenged by writers unacquainted with methods of statistical analysis, and, sometimes, recorded as a deduction from data utterly insignificant in comparison with those from which Stevenson drew his conclusion. In the fullness of time various other deductions from the national records made by Stevenson will no doubt appear as new discoveries of private workers who have souls above Blue Books.

It always hurt Stevenson a little that so few members of his profession troubled to read the annual reports of the Registrar-General. It adds to one's sense of regret for his premature loss that at the end of his career the tide began to turn. It is not suggested that, even now, many medical men read statistical reports, but in the last year of his life his medical, as distinct from his statistical colleagues (these latter had recognized his genius years ago) did Stevenson honour. The Royal Society of Medicine awarded him the Jenner medal, and the Royal College of Physicians awarded him the Bisset-Hawkins medal. In recognition of his war work Stevenson was created C.B.E. in 1918. Within the compass of a short obituary notice it is impossible really to justify a judgement on the life-work of one who has devoted himself to a special branch of research. To say that Stevenson was the greatest vital statistician since Farr means nothing to those who have never heard of Farr, and seems a polite hyperbole to those whose only knowledge of the subject is that Farr was the founder of modern medical statistics. The claim can only be canvassed by the very few who have really studied the official statistical publications of the last twenty-three years. Among these few there is little chance of disagreement.

Those who were honoured with Stevenson's personal friendship will feel the loss of the man at least as keenly as all statisticians will lament that so great an investigator was not spared to enrich the literature of his science with some work in which might have been summarized the results of more than twenty years' research. He was a great gentleman as well as a great statistician.

M. G.

SIR HENRY SIMSON, K.C.V.O., M.B., C.M.

F.R.C.P.LOND., F.R.C.S.ED., F.C.O.G.

Obstetric Surgeon, West London Hospital, and Dean of the West London Post-Graduate Medical College

We regret to announce the sudden death, on the evening of September 13th, of Sir Henry Simson, the distinguished obstetrician who was in attendance upon the Princess Royal at the birth of her two sons, and upon the Duchess of York at the birth of Princess Elizabeth and of Princess Margaret Rose.

Henry John Forbes Simson was born in India on December 12th, 1872, the son of Robert Simson of the Bengal Civil Service. During his student days at the University of Edinburgh he was elected president of the Edinburgh Royal Medical Society. He graduated M.B., C.M. in 1895, and obtained the F.R.C.S.Ed. in 1899, having held in the meanwhile resident posts at the Royal Infirmary, the Royal Hospital for Sick Children, the Royal Maternity Hospital, and the City Fever Hospital in Edinburgh. He then came to London in order to practise as an obstetric surgeon, and was appointed to the staff of the Hospital for Women in Soho Square. Not long afterwards he became assistant obstetric surgeon to the West London Hospital, and continued on the active staff till the time of his death. He also identified himself with the work of the West London Post-Graduate Medical College, of which he had been dean for some years past. In 1901 he became M.R.C.P., and was elected F.R.C.P. in 1926. He served for five years as examiner in midwifery for the English Conjoint Board, and was also examiner in obstetrics at the University of Leeds. In 1925 he was created K.C.V.O. His wife, Miss Lena Ashwell, the well-known actress, received the O.B.E. for her work during the war in organizing concert parties for the troops in France and elsewhere.

Sir Henry Simson was a foundation Fellow and member of Council of the British College of Obstetricians and Gynaecologists. For long past he had given anxious thought to the problem of the care of the pregnant woman and the teaching of obstetrics to medical students and midwives. His opinions were set out very frankly in a paper "Concerning maternal mortality in childbirth," which appeared in these columns on May 11th, 1929.

Dr. TREVOR B. DAVIES sends the following appreciation:

I had the privilege and pleasure of assisting the late Sir Henry Simson in practically all his obstetric work for over ten years, and therefore can speak with confidence of his skill as an obstetrician. He was a past master in the art of obstetrics. It was a real education for me, when I became associated with him, to observe his methods and technique. He had an ideal temperament for obstetric work, and much of his success was due to his infinite patience—perhaps the greatest virtue an obstetrician can possess. His gentleness and charm of manner were also a tremendous asset. It was an object lesson to see him palpate the abdomen—his fingers seemed to be extraordinarily sensitive. I saw him work under every possible condition; he was always the same—he was as calm and collected under the most trying circumstances as when things were easy and straightforward. I never saw him at a loss in any obstetric emergency, and he was able to impart an air of confidence to everyone round him. His energy was amazing, and it was a constant source of wonder to me how he managed to get through all his work. Sir Henry Simson took a tremendous interest in the Post-Graduate College of the West London Hospital, and had devoted a good deal of time to the study of post-graduate education. His work as Dean of the College will always be remembered by his colleagues at the West London Hospital. Nothing was too much trouble for him, and countless post-graduates will remember his kindness and advice when they interviewed him. Sir Henry resigned from the staff of the Hospital for Women, Soho, after his serious illness a few years ago, but continued with his work at the West London Hospital, where his loss is greatly deplored.

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Dr. HARRY REGINALD BURPITT of Newport, Monmouthshire, who died on August 26th, studied medicine at Cardiff and St. Mary's Hospital, London, and qualified M.R.C.S., L.R.C.P. in 1904. He held appointments at the Royal Devon and Exeter Hospital, and at Darenth (Dartford) and Cane Hill Mental Hospitals, and in 1911 became assistant school medical officer—later medical inspector of schools to the county borough of Newport. His twenty-three years' service to the school children and the great respect in which he was held generally were aptly called to mind by the very large attendance at his funeral of members of the medical profession, of children and their parents, teachers, and members and officials of the Education Committee and the corporation.

Mr. ERNEST RAVENSWORTH HART, ophthalmic surgeon to the Royal Hampshire County Hospital, Winchester, and to the Hampshire County Council, died on August 25th at the age of 44. Born in Paris, the son of the Rev. H. Bramley Hart, he studied medicine at Guy's Hospital, and obtained the M.R.C.S. and L.R.C.P. diplomas in 1911. At an early stage he was drawn to eye work, for which he had an instinctive bent, and after being house-surgeon at the Evelina Children's Hospital he returned to Guy's Hospital as ophthalmic house-surgeon. But his ambition to specialize in ophthalmic surgery had to be postponed, and shortly before the war he embarked on general practice, entering a partnership in Derby. In 1915 he took a commission in the R.A.M.C., and after being ophthalmic surgeon to the Northern Command went out to Salonika. The war over, he re-entered general practice in a partnership at Hertford. Within a short time he was appointed honorary surgeon to the Hertfordshire County Hospital, and in 1929 became senior surgeon. One of his colleagues there writes: His private practice was a large one and his work at the County Hospital extensive, and characterized by its care and thoroughness. In 1930 the increasing work done by the hospital made it imperative to carry out a scheme of extension. His clear-sighted views with reference to necessary changes and readjustments were most valuable. All this time he had maintained his early interest in ophthalmology, and for ten years was clinical assistant at Moorfields Eye Hospital, where he went up weekly. At last, in 1930, he fulfilled his long-cherished ambition, and gave up general surgery to specialize in ophthalmic work. He devoted particular study to the problems of squint and myopia, and was collating notes on these subjects when illness overtook him.

Medical News

Dr. Cecil Wall, physician to the London Hospital and to the Brompton Hospital for Diseases of the Chest, has been elected Master of the Society of Apothecaries.

The inaugural address at the Westminster Hospital Medical School will be delivered in the board room of the hospital on Monday, October 3rd, at 3 p.m., by Mr. Spencer Leeson, M.A., head master of Merchant Taylors' School, with Sir Henry Hadow in the chair.

The annual distribution of prizes at Charing Cross Hospital Medical School will be held on Friday, September 30th, in the hospital, following tea at 4 p.m. The annual dinner of past and present students will take place on October 1st in the Royal Adelaide Gallery (Gatti's Restaurant), at 7.30 for 8 p.m., with Dr. William Hunter in the chair; cost of tickets 10s. each. A special post-graduate course restricted to old Charing Cross students will be held on Saturday and Sunday, October 1st and 2nd, from 10 a.m. to 5 p.m.

Medals and prizes gained in the University of Birmingham Faculty of Medicine will be distributed on Tuesday, October 4th, at 5 p.m., in the Medical Lecture Theatre, Edmund Street, and Professor J. T. J. Morrison, F.R.C.S., will give an address.

Dr. H. M. Vernon will read a paper on "The measurement, in relation to human comfort, of the radiation produced by various heating systems" before the Institution of Heating and Ventilating Engineers, on Tuesday, October 4th. The meeting will be held at 6.45 p.m. in the lecture room at the Home Office Industrial Museum, Horseferry Road, Westminster.

A lecture on the Red Cross and maternity and child welfare in India will be given by Miss Norah Hill, organizing secretary of the Indian Red Cross Society, with Sir Bhupendra Nath Mitra, High Commissioner for India, in the chair, at the College of Nursing, Henrietta Street, Cavendish Square, to-day (Friday, September 23rd) at 5 p.m.

A meeting of the Historical Section of the Royal Society of Medicine will be held on Wednesday, October 5th, at 5 p.m., to commemorate the centenary of the Anatomy Act. Dr. Andrew S. Currie will read the opening paper, entitled "Robert Knox, Anatomist, Scientist, and Martyr," to be followed by a discussion in which Dr. Alexander Macphail (H.M. Inspector of Anatomy), Professor E. Barclay-Smith and J. Ernest Frazer, and "James Bridie" (Dr. O. H. Mavor) will speak. Professor D. Fraser-Harris will show lantern slides illustrating medical Edinburgh of the period.

The London County Council has arranged two courses of lectures and demonstrations on clinical practice and in hospital administration for the Diploma in Public Health. Each will last three months, beginning on October 3rd. One will be given at the North-Western Hospital, Lawn Road, Hampstead, by Dr. A. Joe, and the other at the Brook Hospital, Shooter's Hill, Woolwich, by Dr. J. B. Byles. Particulars may be had from the medical officer of health, L.C.C. Public Health Department (Special Hospitals), County Hall, S.E.1.

Dr. Thomas E. R. Branch (acting chief medical officer) and Dr. Edward P. Minett (health officer) have been appointed members of the Legislative Council of the presidency of St. Christopher and Nevis.

The Fellowship of Medicine and Post-Graduate Medical Association has arranged a whole-day course in general medicine and surgery, to be given at the Metropolitan Hospital, Kingsland Road, from October 3rd to 15th ; it is especially suitable for general practitioners requiring a refresher course. A similar course will be given at the Miller Hospital from October 17th to 29th. Other courses beginning on October 3rd are as follows: dermatology at St. John's Hospital for a month, every afternoon ; oto-rhino-laryngology at the Central London Throat, Nose and Ear Hospital for a month, all day ; and proctology at the Gordon Hospital for a week, every afternoon. Week-end courses will be given as follows: rheumatism at Bath, Somerset, October 1st and 2nd ; chest diseases at the Brompton Hospital, October 8th and 9th ; obstetrics at the City of London Maternity Hospital, October 29th and 30th ; and clinical surgery at the Royal Albert Dock Hospital, October 15th and 16th. An evening course in physical medicine will take place at the London Light Clinic on Mondays and Wednesdays, October 3rd to 25th. Afternoon lectures (free to members) will be given on Tuesdays in October and November at the Medical Society of London at 4 p.m. on renal disease. All courses and lectures are open only to members of the Fellowship of Medicine, 1, Wimpole Street, W.1.

The National Council for Mental Hygiene has arranged a series of lecture-discussions on mental hygiene in every-day life, to be delivered in the Lecture Room of the Medical Society of London, 11, Chandos Street, Cavendish Square, W., on Wednesdays, at 5.30 p.m., from October 12th to November 30th. The lecturers are Dr. Henry Yellowlees, Dr. Mary Barkas, Dr. William Brown, Dr. E. Graham Howe, Dr. Isabel Wilson, and Dr. R. G. Gordon. Tickets, price 1s. 6d. each, or 7s. 6d. for the course, may be obtained from the secretary of the Council, 78, Chandos House, Palmer Street, S.W.1, or at the doors.

The Medical Society of Individual Psychology will hold its first meeting of the session 1932–3, under the chairmanship of Professor W. Langdon Brown, on October 13th, at 11, Chandos Street, W., at 8.30 p.m. In the absence of Dr. Adler in the United States, Dr. Leonhard Seif of Munich will give an address, in English, on the individual and the community. Medical practitioners will be welcomed as visitors, on presentation of card, but applications for membership should be sent to the honorary secretary and editor, Dr. Crookshank. On October 14th Dr. Seif will give addresses at Birmingham to doctors and educationists on educational aspects of individual psychology (local honorary secretary, Dr. C. L. C. Burns, the Council House, Birmingham) ; on October 15th he will address the York Medical Society (honorary secretary, Dr. N. S. Hewitt), on individual psychology and neurosis. Dr. Seif will lecture in London, on October 17th, 19th, and 21st, under the auspices of the Individual Psychology Committee, at the School of Hygiene and Tropical Medicine, Keppel Street, W.C., at 8.30 p.m. Lecture I will be on the tendency to freedom from conflict in life and neurosis, Lecture II on resentment and revolt, and Lecture III on individual psychology and a philosophy of life. Admission will be by ticket, obtainable at the door, or, in advance, from Miss Dudley Short, 43, Regent's Park Road, N.W. ; price, 2s. 6d. for single tickets, 6s. 6d. for the course of three lectures.

Dr. S. Recasens, professor of clinical gynaecology and dean of the medical faculty of Madrid, will take the chair at the opening meeting of the French Congress of Gynaecology, which will be held in Paris from October 3rd to 10th.

The third International Congress against Rheumatism will be held in Paris from October 13th to 15th, when the following subjects will be discussed: (1) the initial symptoms of chronic rheumatism ; (2) rheumatism and tuberculosis ; and (3) rheumatism and profession.

Mlle M. Condat, who has held the post of *agrégé* since 1923, has recently been appointed professor of therapeutics in the medical faculty of Toulouse. This is the first time that a woman has occupied a medical chair in France.

An outbreak of eighty cases of typhus has recently been reported in the Piraeus.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to **The EDITOR, British Medical Journal, British Medical Association House, Tavistock Square, W.C.1.**

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated. Correspondents who wish notice to be taken of their communications should authenticate them with their names, not necessarily for publication.

Authors desiring REPRINTS of their articles published in the *British Medical Journal* must communicate with the Financial Secretary and Business Manager, British Medical Association House, Tavistock Square, W.C.1, on receipt of proofs.

All communications with reference to ADVERTISEMENTS, as well as orders for copies of the *Journal*, should be addressed to the Financial Secretary and Business Manager.

The **TELEPHONE NUMBERS** of the British Medical Association and the *British Medical Journal* are MUSEUM 9861, 9862, 9863, and 9864 (internal exchange, four lines).

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The address of the Irish Office of the British Medical Association is 18, Kildare Street, Dublin (telegrams: *Bacillus, Dublin* ; telephone: 62550 Dublin), and of the Scottish Office, 7, Drumsheugh Gardens, Edinburgh (telegrams: *Associate, Edinburgh* ; telephone: 24361 Edinburgh).

QUERIES AND ANSWERS

Pasteurization of Milk

Dr. J. E. H. GATT writes from Malta: Will any dairy expert kindly explain what is meant by the "holder method," and why it is considered more efficient than other methods? In the *British Medical Journal* of August 13th (p. 315), under "Milk-borne infections," the following statement appears: "Pasteurization by the 'holder' method, when efficiently carried out, was shown to kill both microbes"—that is, the tubercle bacillus and *B. abortus*. I would be grateful for information as to dairies where the method is in vogue and may be practically demonstrated. I hope to be in London between September 27th and October 10th.

Dupuytren's Contraction

"P. M. K." writes: Assuming it to be due to a degeneration of the cervical plexus, can any treatment be described or referred to which will cause arrest of the condition of fibrosis of the tendon fascia with its ultimate consequences? Inherited tendency probably. There has been for many years a permanent premonitory capillary flushing of the whole hypothenar eminence of the affected side, and to a much lesser degree of that of the left hand, in which no growth has appeared so far.

Injection for Hydrocele

Dr. E. C. DAWSON (Derby) writes: I note with interest Dr. S. Bartlett's reply (August 20th) to "H. C.'s" inquiry of July 30th. I can recall a similar but more alarming case than that quoted by Dr. Bartlett. I withdrew 10 oz. of fluid from the hydrocele of a man 45 years of age, and replaced it with 2 c.cm. of 10 per cent. sodium morrhuate. The hydrocele was of recent origin, never before having been tapped. About one minute after the injection the patient complained of abdominal pain, which gradually grew worse and worse, till after five minutes it became agonizing. Sweat was profuse, his face became an ashen colour, and the pulse weak and rapid. Fifteen minutes' rest produced no improvement, so I immediately removed him to hospital. Morphine was required for forty-eight hours to relieve his pain, after which he quickly recovered. A small quantity of fluid returned in the sac, but this reabsorbed and the hydrocele was cured. In a previous case 2 c.cm. of 5 per cent. sodium morrhuate produced no effect in an old, long-standing case.

"Refractory Impetigo"

Dr. F. A. E. SILCOCK (Leicester) writes in reply to Dr. L. I. Hardy's inquiry under the above heading (September 10th, p. 538): From the signs and symptoms it would appear to me that the case might be one of chronic pemphigus. The tendency to formation of bullae on any slight pressure on any part of the skin, which soon burst, scale over, and eventually disappear, leaving a pigmented area, is apparently due to a diminution of the cohesion between the epidermal cells of the stratum granulosum and stratum lucidum, and is known as acantholysis. This diminution of cohesion, which easily splits the epidermis into two layers,

is known as Nikolski's sign, and is sometimes present in chronic pemphigus and in epidermolysis bullosa. The latter condition, however, is of congenital origin, so that it can be ruled out in the case referred to by Dr. Hardy, whereas chronic pemphigus may occur in debilitated persons who are past middle age. With regard to treatment, I would suggest a calamine-cum-acid carbolic cream, containing five minims of carbolic acid to the ounce of calamine, for local use. Internally, I would try liq. arsenicalis, pushed if necessary to the point of tolerance, or, failing that, quinine similarly.

Softening the Beard

Dr. JOSEPH JONES (Leigh, Lancs) writes: "W. B. D." (September 17th, p. 576) will probably find Parke, Davis and Co.'s new shaving cream more useful than anything else he can try.

"SYBARITE" writes: As a fellow sufferer with "W. B. D.," and one who has managed to convert a loathsome task into a tolerable one, I would advise as follows. If expert capacity to strop and use a "cut-throat" is lacking, let him try: (1) A Rolls safety razor—preferably with some spare blades on which to ring the changes. I have found this type cut the beard rather than avulse it. (2) Boiled soft (or rain) water. (3) Palm-olive shaving cream. It is also an advantage to have a hot bath, with copious lathering of face, immediately prior to shaving. If any soreness still persists, let him use Pond's cold cream on retiring at night. The skin as a whole should be kept in good condition by careful dieting, little or no alcohol, as much fresh air and exercise as a practitioner can obtain, and Turkish baths if available. The discomfort after a barber's shave is probably due to: (1) the use of hard tap water; (2) suboptimal soap; (3) exposure to open air immediately before and after.

"EXPERTO CREDE" writes: One of the best ways to ensure a comfortable shave is to rub the face lightly, after lathering, with a piece of smoothed pumice stone, working up the soap again after doing so. Hand lathering is, of course, infinitely better than using a brush.

Income Tax

Cost of Maid's "Keep"

"E. F. G." finds himself in disagreement with the inspector of taxes as to whether the cost of a maid's keep should be reckoned at 15s. per week or 20s. per week.

*** We have certainly known cases where an allowance was agreed with the inspector on a basis of 20s. per week, but so much must depend on the general level of prices in the locality and on the particular standard maintained by the individual taxpayer that it is impossible to lay down any general rule.

Sale of Practice

"F. E. W." sold his house and practice as from March 31st; he has retired from professional work and has no income except from investments.

*** For 1932-3 and subsequent years "F. E. W." will cease to be liable to income tax in respect of professional earnings, and his declarations of income for those years will omit all reference to receipts (if any) derived from the book debts of the practice. As he has no professional income for 1932-3 there is no need to supply details of his earnings for 1931-2, unless the authorities seek to adjust the income of his final year to the amount of the profits of that year. If the income from the investments is taxed he will have a claim to repayment for 1932-3 in respect of the personal allowances.

Sale of Share in a Practice

"W. E." has taken a partner on a 49/100 share basis as from September 1st. How will this affect the tax payable in January?

*** The gross assessment for the year ending April 5th, 1933—that is, before deduction of "W. E.'s" personal allowances—is based on the cash profit for his previous account year, to July 31st, 1931, and will normally remain unaffected by the change. The incoming partner will be liable to tax in respect of his share of the gross assessment, which for illustration we will assume to be £1,500. On that basis the partner's share for 1932-3 will be 49/100 of 7/12 of £1,500 = £429, from which he will, of course, be entitled to relief in respect of such personal allowances as may be due to him. "W. E.'s" share will be £1,500 − £429 = £1,071, less his allowances, and the tax payable in January will be affected accordingly. If "W. E." and his partner unite in requiring the practice to be dealt with as if it had ceased on August 31st, and a new one had been begun on September 1st, they can have that method of computation, but it is open to doubt in most cases whether there is any gain to taxpayers from this procedure in the case of professional practices assessed on the cash basis. If the practice is growing, or is likely to grow (and the introduction of an additional partner suggests that that is the case), it would pay "W. E." better to adhere to taxation on the previous year's basis. If so, then his liability for the year 1932-3 will be on 5/12 of £x + 51/100 of 5/12 of £x (£x being the amount of profit of the year to July 31st, 1931). That will probably be less than the amount of the practice profits of the five months to September 1st, 1932, plus fifty-one hundredths of those of the seven months to March 31st, 1933.

LETTERS, NOTES, ETC.

Dressing for Raw Skin Surfaces

Dr. R. D. MOTHERSOLE (Bolton) enters a plea for a more sympathetic and scientific treatment of raw surfaces, and describes two cases in which raw irritable surfaces of the hands had been dressed with boric lint which stuck to the wound. He writes: Recently I saw a patient who had lost a lot of skin in an accident some seventeen weeks before and was under treatment at a third hospital. Again the dressing was boric lint, the fluffy side sticking to several raw places, causing bleeding on removal. I should have thought it was a truism that every raw surface (except when there is an acute infective process) should be protected from contact with irritating gauze or lint by a piece of gutta-percha tissue, thin rubber, or oiled silk, the size of the raw surface, and perforated or nicked to allow the escape of discharge. For most cases gutta-percha tissue is the best. It is surprising how much suffering can be saved to the patient, how much less discharge there will be, and how much more quickly the wound will heal if this simple and humane method is adopted.

Differential Count of Leucocytes

Dr. A. FRASER (Glasgow) writes: The following is a rapid method of finding the percentages in a differential count without any calculation. Having determined the necessary number of hundreds of leucocytes to count in order to obtain a true picture—say 100 × x—take that number of dried melon seeds. Place a small box for each type of leucocyte beside the microscope. When a leucocyte is seen drop a seed into the corresponding box. When the 100 × x seeds have been used count the seeds in each box and divide by x, and you have the percentage.

The Female Figure: Ancient and Modern

"M.D.," late I.M.S., writes: I have waited patiently for somebody to refer to an aspect in the discussion on maternal mortality which appears to me to be very obvious, but which nobody so far has even mentioned. I refer to the dysgenic selection of wives that has been operating amongst the Anglo-Saxon peoples now for at least half a century, but probably for much longer. To put the matter plainly, we appear to be breeding from the wrong type of woman. If one looks at a statue of Astarte, or a painting of the female figure by one of the old masters, one is struck by the width of the hips, the generous proportions of the pelvis, the wide and prominent pubic arch, the curved and rounded thighs, and the general womanliness of build. But the modern ideal of feminine beauty seems to be a wide-shouldered, lean-flanked, narrow-hipped, flat-thighed, sexless creature, with a masculine pubic arch, and consequently a small genital outlet looking downwards rather than downwards and forwards. Those of us who are not gynaecologists can verify this by strolling along a modern sun-bathing beach and keeping our eyes open. Is it not possible that the low rate of maternal mortality in Holland may be related to the fact that the Dutchman likes his women, like his ships, "broad in the beam"?

Vacancies

Notifications of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals, will be found at pages 43, 44, 45, 46, 47, and 50 of our advertisement columns, and advertisements as to partnerships, assistantships, and locumtenencies at pages 48 and 49.

A short summary of vacant posts notified in the advertisement columns appears in the *Supplement* at page *184*.

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